

The Mining Journal

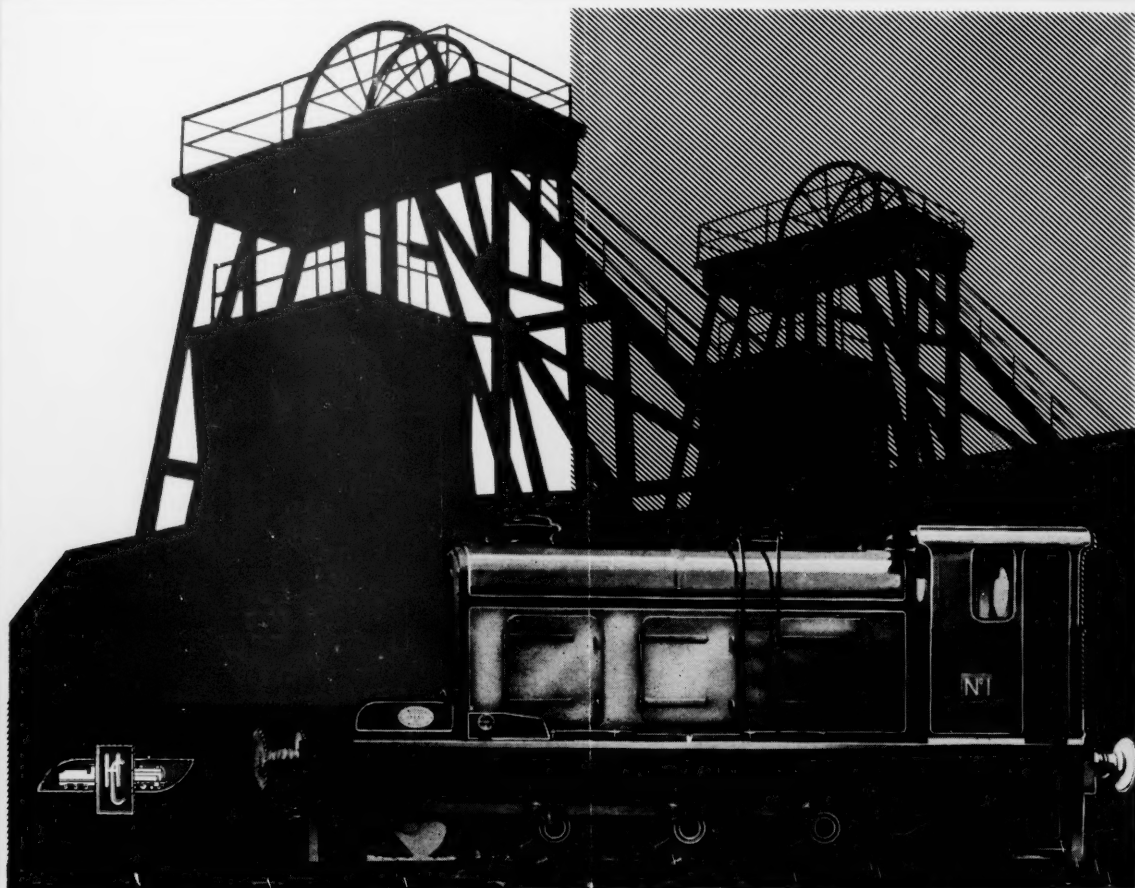
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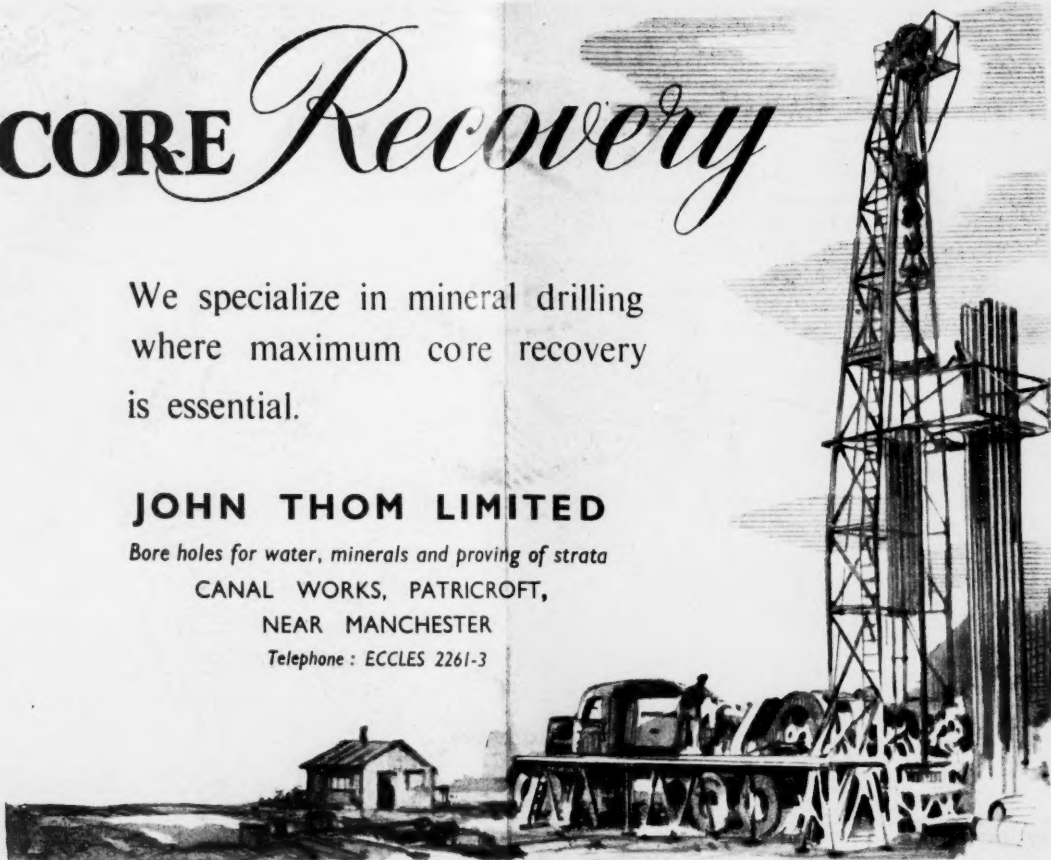
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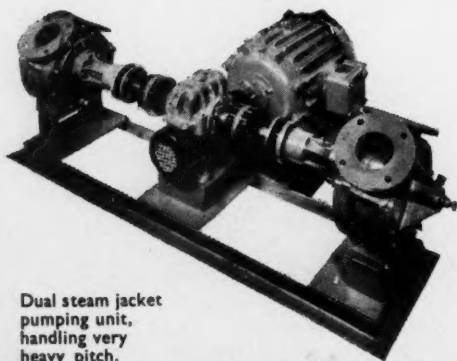
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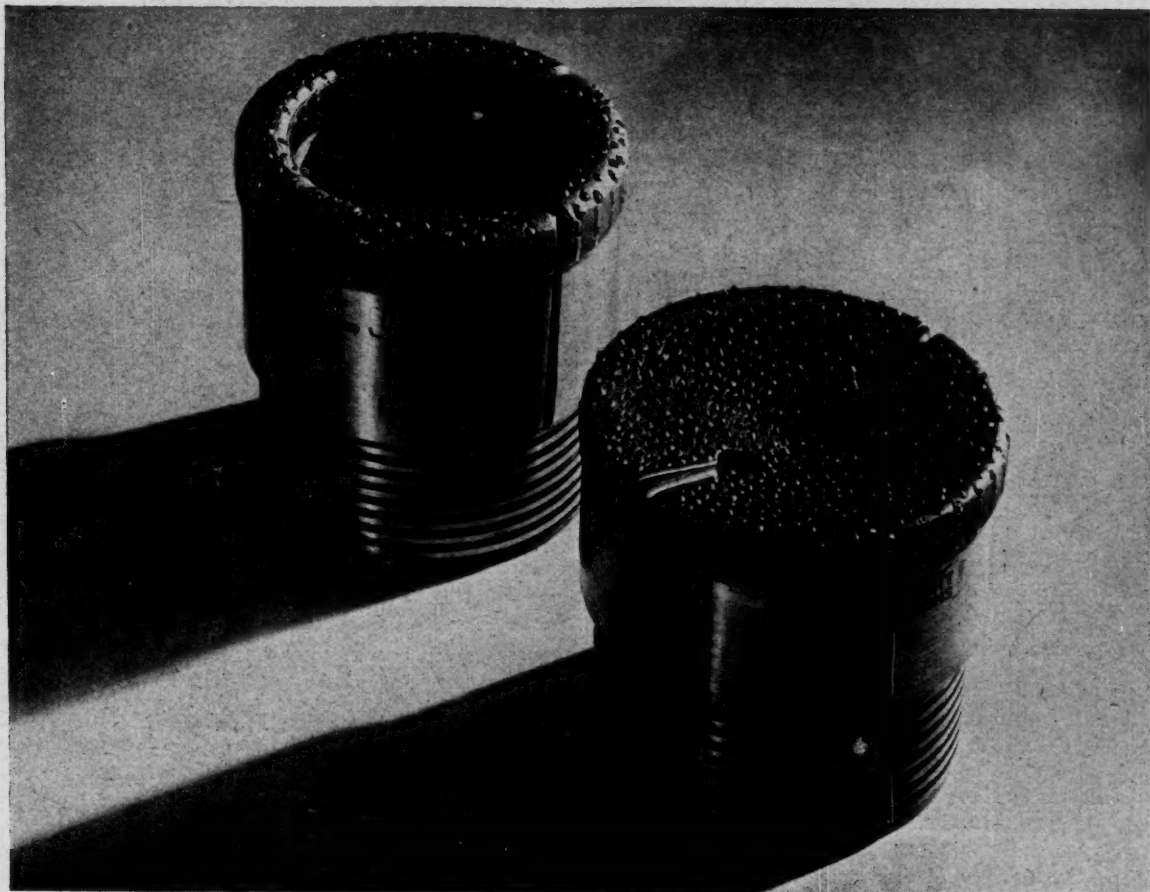
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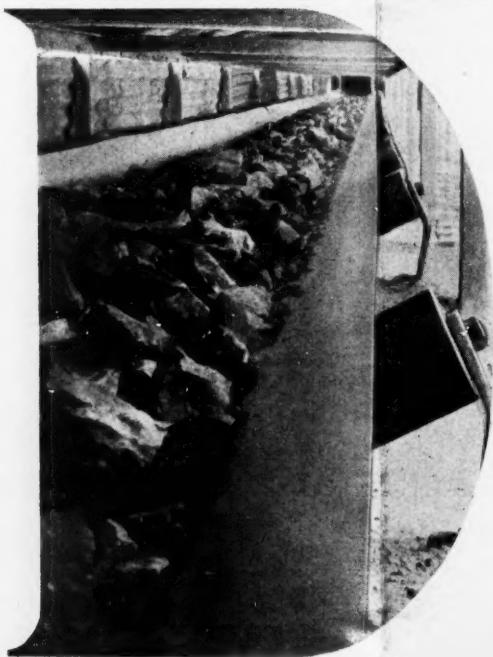
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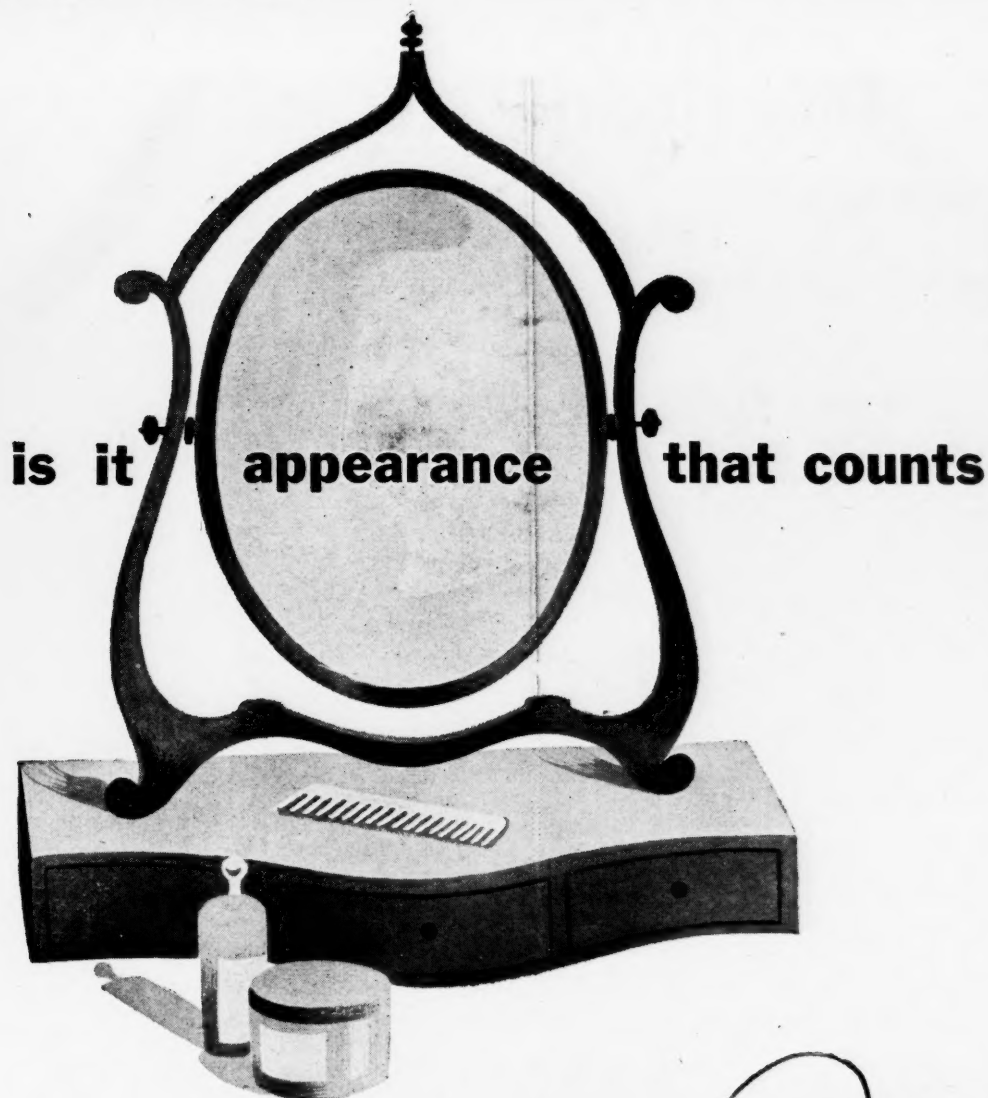
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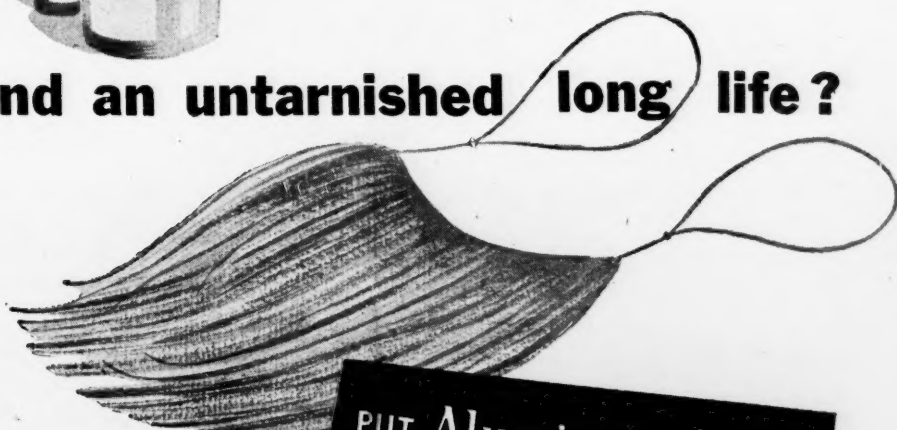
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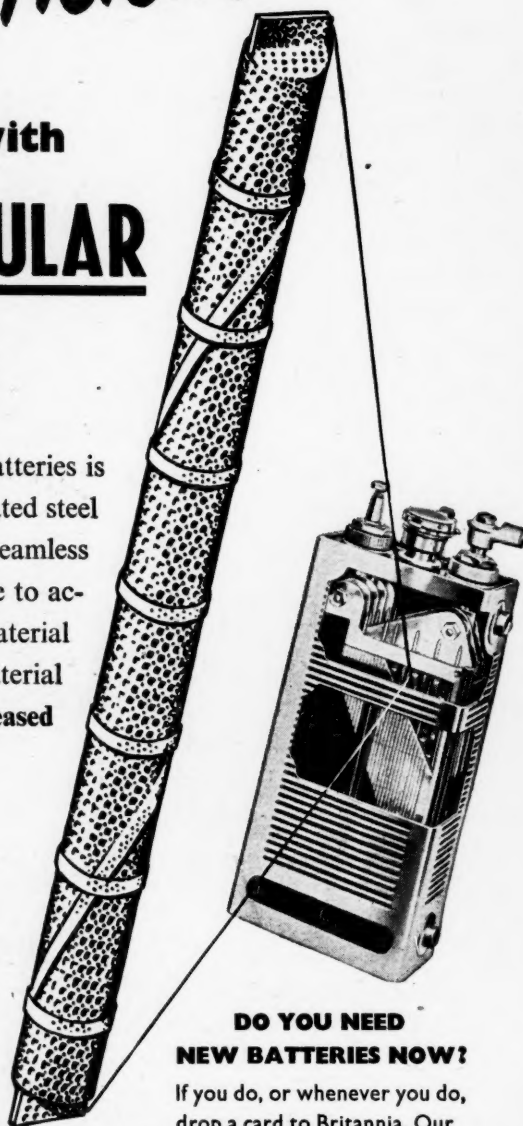
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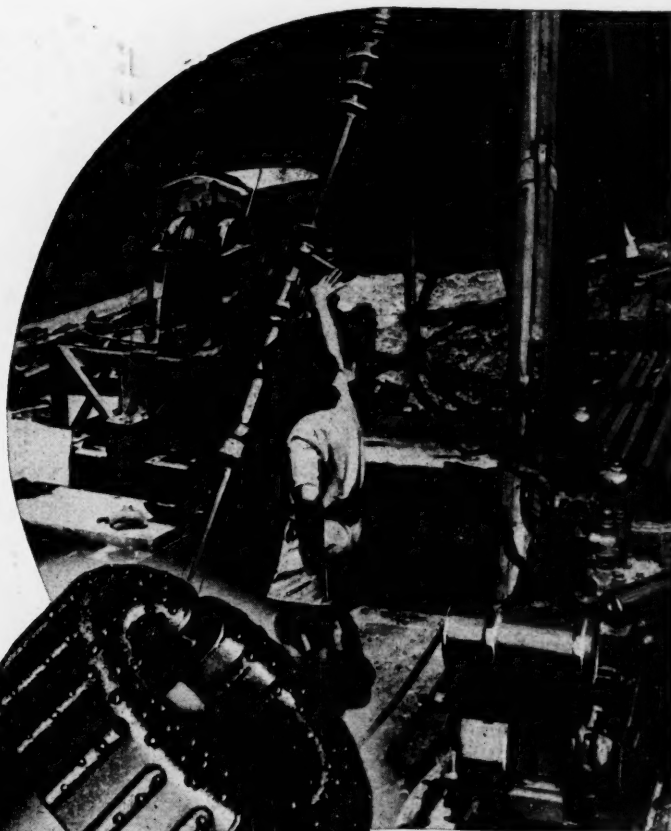
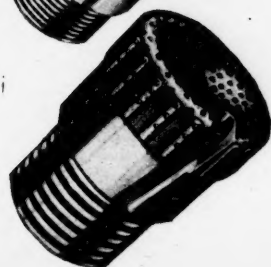
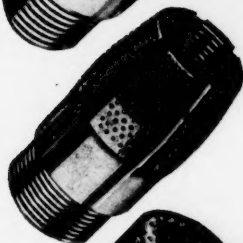
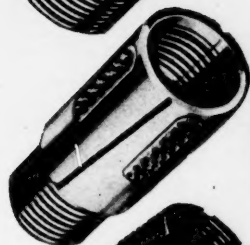
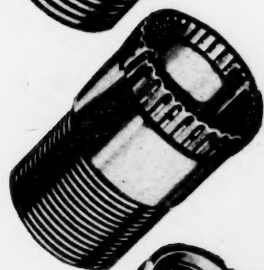
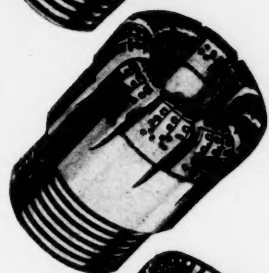
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Coronation of Elizabeth II

On Tuesday of next week the eyes of the world will be focused on the Coronation of Her Majesty, Queen Elizabeth II.

Never before has a Royal occasion, in which the scene is set for the inauguration of the reign of a new Sovereign, attracted the attention and presence of the Statesmen and rulers of so many diverse countries within the ambit of our diverse and worldwide Commonwealth and Empire. The event offers the opportunity of a summation for the outcome of the vital struggles in which the British race and its associates has been engaged more or less ever since 1914, and invites, or we might almost say compels, an appraisal of our position and prospects. It bids fair to be the greatest pageant of British influence in the world and is one which no other country could stage to-day in its comparable extent.

It is inevitable that our minds should revert to the Coronation of the first Elizabeth in 1559, which after a succession of wars, foreign and civil for over 200 years set a final seal to the character which the Empire was to assume in succeeding generations, as it was the beginning of a reign of artistic renaissance and the freeing of political thought together with the religious reformation in England. May we hope that the Coronation of Elizabeth II may mark the foundation of a new world-wide confederation; the Commonwealth and Empire?

The period of the reign of Elizabeth I, sublimated in the language of the Court writers as Gloriana, covered a period when there was immense expansion outwards leading to the establishment and growth of "plantations and colonies" abroad, and especially in the new world, for which the Queen and her advisers found in the centuries old Government of the Channel Islands—the only surviving link with the old Dukedom of Normandy—a pattern of Government ready to hand.

The reign of the virgin Queen witnessed the inaugura-

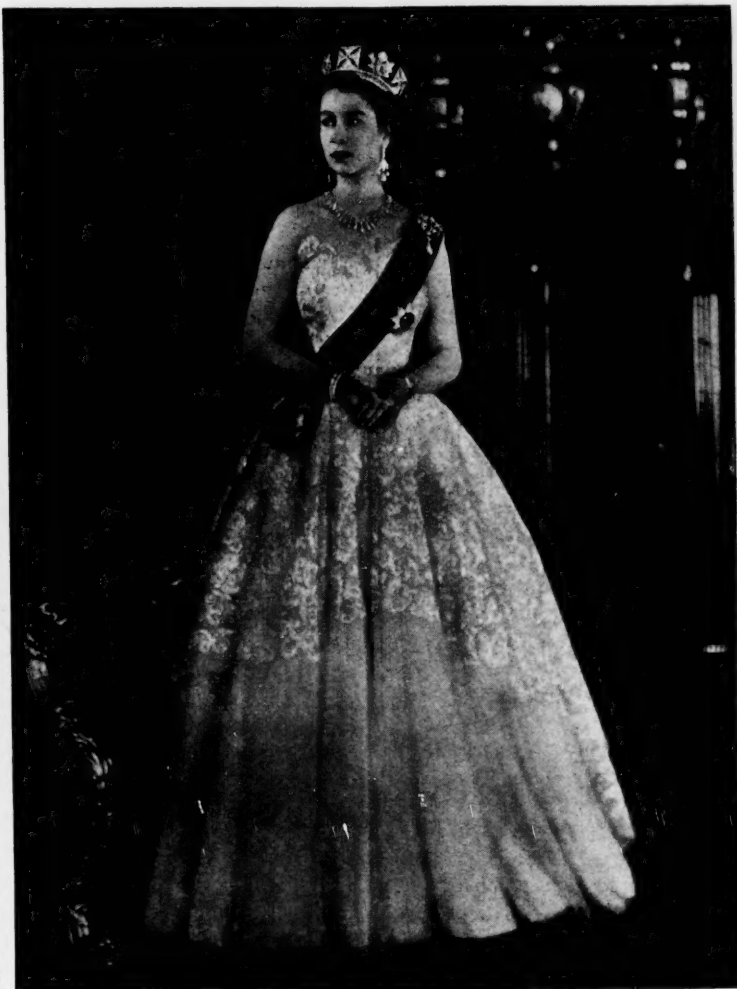
tion of a migration of English colonists and settlers, which continued with many set-backs, and adaptations, and which saw Great Britain established after the Napoleonic wars as a world-wide colonial power of the first magnitude, and which a century of peace consolidated under Victoria.

The Coronation of Elizabeth II nearly 400 years later promises what we may all hope will prove a new sublimation of another epoch of world-wide consolidation of British hegemony, of British influence, moral and material. The assembly in London of representatives of all parts of the Commonwealth offers an opportunity from which a new inspiration and organic growth may be envisaged.

The Conference of the Commonwealth Premiers in London in November last testified to the general desire for a constitutional evolution which would give greater co-ordination to co-operation between the various self-governing states, but what is perhaps the most difficult task, framing the details of the immensely complicated issue of Federative measures by which the consummation may be attained through the deliberations which will ensue after the Coronation ceremony. There can be little doubt that the building of the Commonwealth and Empire structure has aroused an enthusiasm overseas as great, and pos-

sibly greater, than we can sense in the homeland. Most of the leading States comprising the Commonwealth have, by formal instruments, adopted Elizabeth as their Queen—Queen of Canada, Australia, New Zealand, South Africa, Ceylon, Pakistan, and doubtless of the Dominion now in formation of Central Africa, to say nothing of her more mechanical acceptance by countries still under the control of the Colonial Office.

So much for the vision which the Coronation inspires and which may play a very important part in its



realization. For the moment we can not but be inspired with enthusiasm for an occasion, which may well be unique in our history. But before the airy fabric of this dream can be translated into reality we must not ignore the many grave and multifarious difficulties which must be overcome. In one respect the Federation of the Commonwealth Empire to-day has an incalculable advantage over the situation with which Elizabeth I was confronted. This can be summed up in the words "Conquest of the Air." To-day New Zealand and all other parts of Her Majesty's overseas Dominions are nearer in time to London than were most parts of the England in Elizabeth's day and in the instantaneous transmission of intelligence there is no comparison. The key-note of co-operation is mutual understanding and personal contact. Here we touch on what is one of the most immediate and obvious problems of more realistic collaboration.

Incidentally associated with this new freedom of intercourse is the intimacy established between Queen Elizabeth and her subjects. She is no abstraction, such as her predecessor must have been to the new races over which her dominion was being extended by her circum-navigators and emissaries. As Heir Apparent to the throne, Elizabeth visited the United States, Canada, and East Africa, in the last of which she received the news of her father's death and her own accession. She will shortly be called upon to make a grand Empire tour accompanied by her husband, the Duke of Edinburgh. From New Zealand she is to address the next Royal New Year message to all her people and after that to embark upon an enormously extensive programme of travel, reaching from Queensland to Tasmania as well as from east to west of the continent. Thereafter the royal pair are to pass into Asia through Ceylon, with, so far as is known at present, stops at Aden and possibly elsewhere. The whole is a tour of immense strain and it is fortunate that age presents no difficulty to so young and vigorous a pair. With no desire to emulate the title assumed by Wilhelm II—*der reisende Kaiser*—we may foresee a day when a routine of royal progresses may become a recognized feature of royal engagements, and by that time voyaging by air may have become so accelerated and improved as to involve no greater effort than train journeys entailed on her more immediate predecessors in their periodic journeys to the Highlands. The effect of such contacts on the imagination of her subjects of all climes and races needs no emphasis. Up to the present it would have been impossible for physical reasons but in the new Elizabethan era it does not call for an undue exercise of imagination to view it as a practical and unparalleled potentiality. Not long hence we shall see the Queen Mother and Princess Margaret visiting South and Central Africa as an advance guard of royal progresses. It is an enormous task to which royalty is now committed and one to which only a family

dedicated to ideals greater than any which have been open to its predecessors could respond. It may be that we are projecting ourselves too far in the realm of imagination in an era when, in the words of the prophet, "Young men see visions and old men dream dreams." But it is impossible not to feel that "there is a tide in the affairs of men, which taken at the flood leads on to fortune" and it may be that the hour of destiny for Britain and the British race is now approaching.

The home lands are over populated. Much of the overseas Empire calls for immigrants, at any rate from an economic point of view. During the War period we have seen immense development in the exploitation and pursuit of the natural resources of the under developed countries of the world. There is abundant opportunity for an intensification of the migration of our surplus population to countries enjoying the European ethos. But immigration is not enough without the financial nexus which will enable existing industries to expand, and new discoveries, more particularly our mineral wealth, to be supported. The financial exigencies of individual States have caused the temporary adoption of multifarious restrictive measures in an attempt to attain some balance between expenditure and receipts. The British banking system, up to the outbreak of the second World War, largely dominated the investment potentialities available to much of the rest of the world, and this has resulted in all kinds of restraints on mutual trade and industry. Thus means must be devised by which these restraints can be gradually eliminated and true co-partnership between financial power and economic potentialities gradually beaten out. Collectively, the financial power of the Commonwealth greatly exceeds that of its individual members and an elastic system comprehensive of the opportunities of each and all, possibly in the form of a Commonwealth Bank, demands early and serious consideration. Such a system would call for the application of progressive elucidation by the method of trial and error. We can only say that in no branch of industry would such a consummation be welcomed more than in the mineral industry, which year by year becomes of increasing importance to the material prosperity of the world.

Such then, are some of the facets which the coronal of Empire flashes before our eyes in this Coronation season.

The constitutional position of Elizabeth II differs immensely from that of Elizabeth I three centuries ago, but in one respect there is no dissimilarity. Both enjoy the support and affection of their subjects and have evinced that gift of attracting personal popularity which is the foundation of true relations between the Sovereign and Her subjects. May the second Elizabethan reign prove as long and glorious as that of her great namesake and predecessor.

Long Live The Queen

The Mining Journal

Established 1835

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LONDON, MAY 29, 1953

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NOTES AND COMMENTS

Steel Team Selected

The Government has lost no time in selecting the eleven men who are to constitute the new Iron and Steel Board. Exactly a week after the de-nationalization Bill received the Royal Assent the Minister of Supply has nominated the members of the authority which will be entrusted with the general supervision of the development of the industry and the fixation of maximum prices.

Of the three full-time members both the chairman, Sir Archibald Forbes, and the vice-chairman, Sir Lincoln Evans, have already had experience as members of the pre-nationalization Steel Board, whilst Mr. Robert Shore has made a considerable reputation as a director of the British Iron and Steel Federation. The remaining eight members, who are to serve on a part-time basis with an allowance of £1,000 a year, represent a careful blend of producing and consuming interests, and trade unionists, with the managing director of the Dunlop Rubber Co. to offer an independent view during the Board's deliberations. Their responsibilities are heavy, and their purpose clearly defined. Theirs is the task of reconciling private initiative and enterprise with a considerable measure of public control, and they are entitled to a respite from criticism until the results of their labours become manifest.

For the most important step, the Steel Board will bear no responsibility. The disposal of the steel plants to private investors will be the exclusive responsibility of the Iron and Steel Holding and Realization Agency which has yet to be constituted. It is desirable that this Agency should get to work quickly. At best it will be a task of considerable magnitude and complexity. It is believed that large sums are held in reserve for these investments and the moment is favourable for a quick sale. The Agency should be appointed with the least possible delay, and the day fixed for the mechanism of the Act to be set in motion.

I.C.I. in 1952

Imperial Chemical Industries provide many of the components essential for the functioning of a nation's economy, be it predominantly dependent upon primary or secondary industries, so that quite naturally demand for the company's products is governed to a large degree by the overall

financial health of the country concerned. This is clearly demonstrated in the company's annual statements, of which the most recent, covering operations in 1952, is no exception.

Broadly speaking, 1952 was a good year, although there was a decline in activity at home and in some countries abroad during the second and third quarters. Factors adversely affecting demand were a continued fall in the demand for certain consumer goods, which led to recession in the textile industries; import restrictions imposed by certain overseas countries; the tendency throughout industry to reduce stocks; and the temporary dislocation of some industries while reorganizing for rearmament work. Nevertheless, the value of home market sales at £276,300,000 was the highest in the company's history, and compared with £262,800,000 in the previous year. Direct exports during the year at £62,000,000 was also a record figure and represented an increase of seven per cent over the figure attained in 1951. The decontrol of many materials simplified the supply problem but some of the more obstinate shortages such as steel, metallurgical coke, and certain capital equipment caused difficulty.

The two influences most hampering to exports were the import restrictions, imposed by countries in order to balance their overseas payments, and exchange difficulties. Indeed, the directors state that it was mainly due to the revival of Far Eastern trade in alkali and fertilizers in the second half of the year which enabled the company to end the year with record export figures.

Demand for explosives and accessories by the mining industry in South Africa increased as a result of the opening up of the new Orange Free State Mines, the demand being met by African Explosives and Chemical Industries Ltd., whose share capital is jointly owned by I.C.I. and De Beers Industrial Corporation. A new explosive plant was opened at Calgary, Canada, designed primarily to serve the needs of the Alberta oilfields and the West Coast of Canada. Other projects under way in Canada include a plant for the manufacture of a blasting agent known as "Nitron" designed for use in open pit mining, quarrying, and seismic exploration. A welcome increase in the export of explosives and accessories for the mining industry in Peru was recorded during the year but import restrictions

in Argentina and exchange difficulties in Brazil kept sales to these two countries down to a low level.

In the section of the report dealing with research and development there is much to interest the mining engineer. Research work on the commercial development of copper base alloys with exceptional sea-water corrosion resistance continued, and particular attention has been given to certain technical problems in the hot-working of these alloys. As part of the general effort to conserve non-ferrous metal supplies attention was also directed to the development of techniques for cladding steel with copper or copper alloys.

In the industrial field the development of fire-resistant conveyor belting and other textile materials for coal mines was actively pursued. General Chemicals and Metals Division continued to make good progress in their research on the production and properties of wrought titanium metal, and work on the small scale Kroll Reactor, which uses the process adopted for large scale production in the U.S., continued, but at the same time a very promising alternative method has been developed in the company's laboratories.

With regard to potash, the sixth and last exploratory borehole in the company's programme for the investigation of the deposits in the Whitby district was completed during the year. As with the other five boreholes, the presence of sylvanite was proved at a depth of around 4,000 ft. The extraction of the deposits by mining was studied, on behalf of the company, by Professor J. A. S. Ritson, of the Royal School of Mines, and on the basis of his report, a forecast has been made of the technical problems involved in mining and refining Yorkshire sylvanite and of the economics involved in such a venture. Fisons Ltd., who made similar studies, reached similar conclusions and a statement on the subject has been made to the Ministry of Materials.

Development in British Columbia

A search for new mines has been instigated in the well-known copper bearing areas of British Columbia, following the announcement that the Granby Consolidated Mining, Smelting and Power Co. has reached an informal agreement with the United States Government for the sale, at 30 c. per lb. of a "certain tonnage of copper" over a fixed period. This latest development is stimulated by the high price of copper as compared with the low prices now prevailing for lead and zinc.

Old and new copper deposits are being explored on Quadra and Texada Islands in the Gulf of Georgia and in favourable areas on Vancouver Island. In this latter district a discovery was recently reported at the northern area near Great Central Lake. Ore reserves at Granby's Copper Mountain mine at the termination of last year were placed at 3,824,000 tons averaging 0.95 per cent of copper per ton.

Other interesting news from British Columbia that tells of growth and development is the report that the Bill to incorporate Kitimat as a Municipal District has been passed by the Legislature, and the outlines of a modern city 450 miles north of Vancouver are beginning to take shape. Steel has been erected at the smelter site and the port facilities are said to be "well under way." A steel bridge, 600 ft. in length, connecting the wharf and plant site with the town will be completed by October of this year, and the Canadian National Railways has already awarded a contract for clearing the right-of-way for a line from Kitimat to Terrace, on its main transcontinental system. It is not anticipated that Kitimat will develop as a town of the typical "company type."

It is estimated that the Kemano turbines will be in operation by the spring of 1954.

The Belgian Congo

(From Our Own Correspondent)

Brussels, May 18.

The principal engineer of the Belgium Colonial Offices Mines Bureau, Mr. Gilsul, has communicated to your correspondent the 1952 production figures for the Belgian Congo and Ruanda-Urundi. Export figures were given in *The Mining Journal* Annual Review number recently but the production figures are more complete and comprehensive. Even so the production table does not include radium, uranium and cobalt, but the total production for the last named metal was given recently by the Governor of Katanga to the provincial council. The following table gives the different mine products in comparison with 1951.

	1952	1951
Copper : tonnes	205,749	191,759
Diamonds (Gem) : cts. ..	549,924	537,740
Diamonds (Industrial) : cts.	11,013,904	10,027,015
Gold : kilos	11,469.650	10,958.077
Silver : kilos	147,034	118,046
Tin : tonnes	12,734.116	12,874.487
Tin-Wolfram concentrates : tonnes	917.413	549.408
Tin-Tantalum concentrates : tonnes	1,276	1,178.725
Tantalite-Columbite : tonnes	104.736	95.947
Wolfram, etc : tonnes ..	630.231	396.503
Cobalt : tonnes	7,000	5,700
Cadmium : tonnes	20.5	24.3
Zinc in ore : tonnes ..	98,948	88,705
Manganese in ore : tonnes	63,989	35,473
Monazite : tonnes	14	37
Bismuth concentrates : kilos	672	322
Bastnäsite : tonnes ..	214	124
Coal : tonnes	252,885	217,900
Salt : tonnes	620	550

The tonnage of mineral products in the last few years steadily increased in the following ratios taking the 1949 output at 100. In 1950 the figure was 110 and in 1951 131, dipping slightly to 129 in 1952. The principal increases were in silver (index figure 539); cobalt (index figure 156); copper (index figure 135); diamonds (index figure 119); and gold (index figure 108). Metals and Minerals in 1949 constituted 52.95 per cent of the total value of exports, last year it was 60.28 per cent of which copper represented 46.37 per cent of the total in 1949, and 50.87 per cent last year.

Portugal

(From Our Own Correspondent)

Oporto, May 14.

There is not much fresh news. It is reported that the E.C.A. has again advanced funds for the development of a tungsten mine, the reported price being well above to-day's quotation. Another disturbing factor is the existence of old contracts also at much higher prices; though such contracts are nominally limited in tonnage, holders of stocks of tungsten ores will not sell at prices below those paid to holders of old contracts, even though the nominal limitation as to quantities precludes unlimited shipments under those contracts.

Production figures for February were: wolfram 395 tonnes, cassiterite 122 tonnes, cupreous pyrites 51,378 tonnes. Export figures for the month of March were: wolfram 203 tonnes, all to the U.S.A., cassiterite, U.S.A. 139, U.K. 25, Canada 16, Germany 10 tonnes; cupreous pyrites 29,950 tonnes, roasted and leached pyrites 11,404 tonnes, white arsenic 112 tonnes, iron ore 17,207 tonnes.

Australia

(From Our Own Correspondent)

Melbourne, April 30.

Despite the unsatisfactory price for gold and the crippling effect of costs, arising from high rates of wages and short working hours, gold mining is improving. Figures for 1952 showed a moderate but satisfactory increase in production and in Western Australia, for the first three months of the year, there has been marked improvement. In that period, 180,489 f.oz. have been reported, compared with 155,166 f.oz. in the corresponding period of 1952. This improvement is not due, alone, to the high grade ore being mined at Central Norseman, New Coolgardie Gold Mines, and Hill 50, in Western Australia, but in part to a swing in public favour from base metals to gold, as a result of the heavy fall in the price of metals generally, and the attraction of tax-free dividends from gold mining. Central Norseman Gold Corporation recent reports give 8 dwt. values for 90 ft. of driving at No. 22 level off the Regent shaft, and in the Princess Royal section 93 ft. of driving averaged 23.5 dwt. over 51 in. Hill 50 has reported the milling of 6,840 tons of ore for the recovery of 2,370 f.oz. of gold.

In the Northern Territory, Australian Development, at Tennant Creek has reported a clean-up of 2,947 f.oz. of gold from the milling of 1,200 tons of ore; there appears to be no reason why these high returns will not continue for a considerable time. A new modern mill is to be built, and mine output will be more than doubled. Ore reserves are estimated at 200,000 tons with a grade of 2 oz. gold per ton.

ENCOURAGEMENT OF GOLD MINING

The Western Australian Department of Mines has announced a scheme for the encouragement of gold mining: the aim is to locate gold occurrences which have been missed, or which are parallel to known deposits and have not been suspected to be gold-bearing; the Department of Mines will carry out its own diamond drilling on such prospects, guided by the advice of its own geologists. If occurrences of sufficient merit to warrant exploration are discovered, they will be sold to interested companies at a price which would recoup the Government for the expenditure incurred. In selected areas the Government would blanket several square miles of country which would be reserved from private prospecting while drilling was in progress. The Western Australian Government plans to make conditions more attractive in the way of assistance financially and through State battery charges and conditions.

In Victoria encouragement to the industry is coming from the results of the Morning Star (G.M.A.) Company's mine where a large body of rich ore has been opened up, and which it is expected will serve as a bank for two or three years. Recent returns for fortnightly periods have given average recoveries of 20, 16, 10, 38, 35, and 25 dwt. gold per ton, and there is good reason to expect continuance of these high returns for some time to come.

MOUNT ISA COPPER SMELTER

A record output of ore was established in March, 54,000 tons of silver-lead-zinc ore and 43,500 tons of copper ore. Production was 3,195 tons of lead, 3,500 tons of 51 per cent zinc concentrate, 271,575 oz. silver and 1,003 tons of copper. Throughput of the copper mill has risen to 1,300 tons of ore per day, for a return of 40 tons of copper per day. Copper will be shipped to America for the first half of this year, for cancellation of public works in Australia has left this country with more copper than it can use.

As a result, Mount Morgan and Mount Lyell are also exporting their copper production for the present, and will do so until the position becomes normal, when copper will be sent to Port Kembla for refining and sale to Australian users.

The Mount Isa copper smelter receives concentrate assaying 24 per cent copper by conveyor belt, at the storage floor which has a capacity of 8,000 tons, and has eight proportioning bins below the end of the floor; proportioned charges of ore and flux are carried to the roaster feed hoppers by belt conveyor. Proportioning bin capacity is 80 and 77 tons. Concentrates are handled on the storage floor by bulldozers. Roaster plant consists of two Garfield type C and W eight hearth roasters, with hearths of 19½ ft. diameter, constructed of firebrick. Oil firing is used for ignition and occasionally for controlling the roast. The roasters are fed by pan feeders and calcines are discharged at a temperature of 1,100 degrees into hoppers delivering into a tarry car. A Buell cyclone type dust collector is used for roaster flue dust collection. Gases are exhausted to the smelter stack by fan. A Cottrell is not used because of the absence of precious metals. Reverberatory furnace practice is similar to the usual practice in the United States.

NEED FOR EXTRA LIME ROCK ELIMINATED

One feature is that the Mount Isa furnace charge contains sufficient crude copper sulphide ore, containing about 9 per cent CaO and 5 per cent MgO, to eliminate the need for extra lime rock for the reverberatory slag. The reverberatory furnace is 90 ft. long by 17 ft. wide with 18 in. thick magnesite crucible, 24 in. silica sidewalls, and 20 in. sprung silica arch. Water-cooled side wall jackets are not used; side walls will be maintained by patching with silica slurry. Charge is fed from the larry car to the furnace by two Wagstaff guns, one at each side of the furnace, 12ft. from the burner wall. Pulverized coal is used as fuel, delivered direct from the mills to four 8 in. burners. There is no intermediate storage for pulverized coal. There will be, ultimately, three pulverizers. About 50 per cent of air needed for combustion will be passed through the burners at a maximum velocity for the coal-air mixture of 116 ft. per sec. at the burner outlet, burning 55 tons of coal per day. The primary air to the pulverizers is pre-heated and also the secondary air admitted at the burners for combustion. The pre-heaters use boiler waste heat gases. Slag is skimmed through the side wall and granulated, picked up by a grab, dropped into draining bins, belt-conveyed to storage bins and hauled by rail for use as mine filling. There are two 10 ft. by 20 ft. basic lined Pierce Smith converters.

FIJIAN MINING

Recent developments in the Emperor Gold Mine are important. At the No. 9 level an east crosscut has intersected a formation at 715 ft. from the main level, the average value being 9 dwt. gold over a width of 20 ft.; driving north and south has disclosed a length, so far, of 300 ft., the average grade throughout being 9 dwt. gold per ton. Further testing by two rises to heights of 50 ft. above the drive has shown similar grade ore. The lode is widening to the north and narrowing to the south. This development is in the direction of two churn drill holes, 1,800 ft. further east, which indicated payable values at depths of 1,430 ft. and 1,640 ft.

The new find is south-easterly from the Wallace Smith shaft, and the particular importance of the discovery is that it is the most easterly operation on the field and gives encouragement for the large scale exploratory campaign which will be carried out by the Emperor, Loloma and Dolphin companies to the east of the Emperor lease.

Recruitment to the Profession of Mining Engineering

The following article is an extract of the address made by Professor J. A. S. Ritson, D.S.O., O.B.E., M.C., on the occasion of his induction as President of the Institution of Mining and Metallurgy. The ceremony was held yesterday, Thursday, May 28, 1953, at Burlington House, Piccadilly, London, W.1. In an era when the importance of minerals to the continued progress of civilization is unquestioned, the new President appropriately devoted his address to the problems of recruitment to the mining engineering profession.

We cannot visualize a world without minerals. Yet in a few years, unless new deposits are discovered or improved methods of treating low grade deposits are developed, certain metals, common enough to-day, may become scarce and very expensive. The discovery of a high grade mineral deposit is becoming a rare occurrence, though luckily such discoveries are still being made and the realization of their potential value appreciated.

VITAL PROBLEMS OF ORE PREPARATION

There are, however, a large number of low grade deposits known throughout the world which cannot be worked economically to-day. The Organization for European Co-operation (O.E.E.C.) is investigating this problem of low grade deposits in Western Europe, including Britain. It may be that as a result many of the present known low grade deposits will become useful sources of metal, or the life of existing mines extended by a reduction in the value of the workable grade. To attain this result the preparation of the ore for the smelter is probably to-day's most outstanding mining technical problem including as it does fine grinding, separation and "pelletising." The need for one or more centralized national ore dressing establishments devoted to fundamental research and to subsequent application is urgent. The problem is too big for an individual establishment or university though the work of several universities or research bodies, maybe each in a different country, could be co-ordinated by some central authority such as the O.E.E.C.

In addition to work at selected universities, Government Research Establishments devoted to the solution of mineral problems should be set up or expanded in various countries. There ought to be one in Great Britain capable of resolving not only local but also the many and varied problems arising in the Dominions and Colonies. The task is too uncertain and the cost may be too great to attract private enterprise, yet of its urgency and importance there can be no doubt.

As is well known, a relatively minor change in circumstances will alter a deposit hitherto of geological interest only, into one that can be worked at a profit; an increase in the value of a metal, a chemical discovery such as the cyanide process for gold, pressure leaching or the building of a track for motor vehicles are typical examples.

TRENDS IN THE MINING INDUSTRY

Until the beginning of the 19th century, mining was on a modest scale because industrial demands were small. There are still many small mines to-day—there must be thousands scattered over the globe each employing one or two engineers and a small gang of miners. On the other hand, the trend is towards an increase in the number of large mines each employing dozens of engineers and thousands of mine workers, because ore deposits are being won from greater depths, or from less accessible places. Leaner deposits are being worked from which, in order to make a profit, a larger daily output is essential. The increasing size and depths of these mines involve problems of engineering never experienced by our forefathers and

necessitate the employment of highly trained engineers, mechanical, electrical and metallurgical as well as mining. In many countries, moreover, the mine manager has a statutory responsibility for the safety of all those employed on the mine, so that the chief executive is generally a mining engineer.

A peculiarity of mining is the relatively large number of men employed compared with the horse power consumed. From the nature of the work, close supervision is difficult. In these days it is an arguable point whether the better manager is a good technologist or a tactful personnel manager. The best is undoubtedly a combination of the two.

STATUS OF THE MINING ENGINEER

In many countries the profession of mining ranks high among professional men but in my opinion it is not given the prestige it deserves in this country. To the general public, mining is a dirty and hazardous profession in which death and injuries prevail in terrific proportions. It is commonly thought that working conditions are horrible. We know that this view is utterly false and never was true, not even 150 years ago when many other industries were operating under squalid conditions.

How can we correct this impression when every mining accident is news to be displayed? Even novelists writing of a mining village or family depict coarseness and depravity and usually include a mine disaster. Rarely is anything heard of the inherent courage and good comradeship of the miner.

RECRUITMENT OF FUTURE ENGINEERS

It is generally agreed that insufficient numbers of trained young men are entering the mining industry. One might ask a number of pertinent questions regarding this. In earlier days did the industry, when it got sufficient recruits, make the best of them? Did it ensure that young entrants had a chance of co-ordinating their theoretical education and practical training? Did it provide a satisfactory selection system so that young men, irrespective of wealth or patronage, had their chance? Did it realize that that elusive quality, personality, was as important as technical ability?

On the whole, I think it is true to say that the metal mining industry did these things and it certainly does so to-day. In a unified industry, such as the National Coal Board, recruitment and training of potential managers is given high priority.

There are several reasons which curtail the inflow of recruits. One is the low birth rate during the 1930's. It would be an interesting inquiry to determine how many mining engineers come from large families and how many are younger sons. With smaller families and social security throughout life, family ties and ample opportunity to work at home reduce the incentive for a boy to seek his fortune overseas.

Another cause, perhaps, is the tendency for young men to marry at an earlier age than formerly with a consequent disinclination to take a chance overseas. This is aggravated by the prevalence of working wives who do not want to

give up their job and the freedom that goes with it. I think it would be a good thing if every young engineer arriving at a mine should become a member of an officer's mess. Membership of the mine club is not the same thing. His rank should correspond to an ensign or midshipman, that is, in the officer class but not yet commissioned.

This should not inhibit practical work because young officers in the fighting services do their training on the square exactly as an ordinary recruit and so should young engineers, whenever possible. The analogy between the fighting services and the mining engineer is fair because the mining engineer is fighting nature, a relentless opponent, and the officers of both professions need the same qualities of devotion to duty, courage and integrity.

There are two sources from which recruits are drawn: homes in which parents, relations or friends are already interested in mining; and the schools, Public and Secondary. Recruits from the former need no encouragement, but what about the second class?

The offer of Scholarships to the Universities is one way but it is not as valuable as it once was because most intelligent boys can obtain a State Scholarship. On the other hand, it does provide a means of entry for that large class of boy, who while not possessing a first class scholastic brain, forms the backbone of his school and has shown a willingness to lead and to set a good example to his school fellows, two important attributes of the budding mining engineer.

TROUBLE AT THE SOURCE

The real trouble is the lack of co-operation from schoolmasters. This is not deliberate but is probably due to a lack of understanding of the needs of a fundamental industry or the conditions under which it is carried on. Until schoolmasters, and through them boys and their parents, realize what a satisfying profession mining is, the inflow of recruits will remain less than the demand.

In spite of the national importance of our profession, the interesting work and the opportunities for advancement, there are not enough recruits.

The number of students obtaining Degrees or Associate-ships in Great Britain during the previous four years was:

Year	Metal Mining	Coal Mining	Total
1949	78	96	174
1950	67	110	177
1951	64	105	169
1952	56	102	158

The number of entries in 1953 has declined to 50 metal mining students. In Canada and the U.S.A. the numbers are:

Year	Students
1952	53
1953	39
1954	26
1955	28

The fact is that all over the English-speaking world there is a definite decline in the number of students entering the mining faculties. On the other hand, the average number of recruits that the mining companies would like to enrol annually in Great Britain is 140; in the fields of mining geology (80), economic geology (30) and mineral dressing and metallurgy (30). Coalmining requires up to 200, the figure referring to the desirable average annual number of recruits in the United Kingdom.

From a comparison of the first two tables it will thus be seen that there is a shortage of British recruits which will have, in due course, a detrimental effect not only on the mining industry itself but also on those British firms which

supply the mines with the necessary plant and machinery. Is this dearth due to prejudice, lack of initiative, preference for an office stool at home or just ignorance of the job?

Some of these factors the profession cannot control but steps must be taken to remove any implication that schools are unaware of the attractions of our profession. Of the three classes of men in this world—namely, the retrograde, the stationary and the progressive, the mining engineer belongs to the last and this fact should be broadcast.

THE TYPE OF MAN REQUIRED

Mining being a primary industry, needs the best type of recruit; the officer type of the modern fighting services. Britain still breeds plenty of these men and something must be done to attract them.

Before accepting a recruit his physical condition must be tested and he should successfully pass a clinical and chest X-ray examination. Any physical weakness, particularly of the lungs, is detrimental though to-day silicosis, particularly in a well conditioned mine, is no longer the scourge it once was.

Intelligence is essential, particularly the ability to apply knowledge. Knowledge by itself is of little use in the mine, it is the application that matters. The mining engineer must also have the ability to impart knowledge to workpeople, often uneducated and primitive. He must also be able to mix with other officials and maintain friendly relations with them under trying conditions of climate or stress of work in an isolated camp. He should get on well with the native inhabitants of the country in which he is working, particularly with their leaders, at the same time paying due respect to native customs and beliefs.

As Sir Andrew Bryan said some time ago, mining engineers are concerned with management and the first syllable of this word is "man." Management needs tact, leadership and judgment. Skill at games is not an essential nor is brawn and muscle but keenness on outdoor games as a means of keeping physically and mentally fit is desirable. The possession of a hobby which can detract the mind from the worries of the job and occupy the brain during hours off duty is most valuable.

Moral courage and absolute integrity are important because a mining engineer is responsible for the deeds of men working under him and he must accept this. A man who habitually attempts to put the blame on somebody else never makes good. These may sound like points from a sermon but are essential facets in the character of a mining engineer and should be universally recognized.

SELECTION OF RECRUITS

Selecting suitable young men for training is a difficult and onerous job because a young man wrongly selected may spend five of the most important years of his life in training for a particular job and then find he does not like it or may be considered unsuitable by a prospective employer. Individual selectors tend to look for the qualities in which they themselves excel. Every selection should be made by a small panel but before recruits come before a selection board they should be given an opportunity to learn what the profession means and become interested in it.

A young man who has recently qualified at a recognized School of Mines will have little difficulty in gaining experience and being well paid for it. In some mining fields, especially where a metal bonus system is in operation, this payment may be larger. In addition, living quarters together with some furniture are provided, and all good and established mining companies provide amenities. The health of the community and the sanitation of the camp or township is a prime responsibility for most mining companies.

A Winder Installation in the Orange Free State Goldfields

The plant described in the following article was first brought into service for shaft sinking duties and operated three eight-hour shifts per day for seven days a week with occasional short breaks for maintenance. During that time the general performance is said to have justified the adoption of the new control system described, as from the viewpoint of electrical engineering, much of the interest of the installation centres around the method of control and dynamic braking employed on the winders. Information on the mining area and the property concerned was originally published in *Optima*, a quarterly review of the Anglo American Corporation.

Odendaalsrus, the original centre of operation in the Orange Free State Gold Fields, is now but one of four towns resulting from mining development, the others being Virginia, Allanridge and Welkom. Immediately adjacent to Odendaalsrus is the new mine to which this article refers, where four 4,200 h.p. double drum, A.C. electric winders have been installed and commissioned by the company. The installation is of particular interest, since these are the first winders to use the company's new dynamic braking and motor control system.

FUNCTIONS OF THE SHAFTS

At this mine two 47 ft. by 11 ft. rectangular shafts, the proposed initial depths of which are 6,000 ft. and 5,000 ft. respectively, are divided into seven compartments, four for winding, and the others for ventilation and pipes. Each shaft is served by two double drum A.C. electric winders. These are used for handling rock, men and materials and normally work in balance, but are also capable of handling the maximum unbalanced load. Each winder will accommodate 16,000 lb. of rock per wind, giving a maximum output, based on 12 hours' rock hoisting a day for 25 days a month, of approximately 57,000 tons, or a monthly tonnage from the mine of 228,000 tons.

The full complement of underground workers, representing 5,500 men, can be lowered down the two mine shafts within 1½ hours, at maximum hoisting speed of 3,000 f.p.m., with acceleration and retardation rates of 3 ft. per sec., per sec.

The mechanical parts of the winders and the layout of the equipment were designed by Fraser and Chalmers, the company's mechanical engineering works at Erith, and, except for gears and drum shafts, were made in South Africa by the East Rand Engineering Company.

The winders have double parallel drums 14 ft. dia. by 7 ft. wide, which are loose on the drum shaft and are driven through multiple tooth clutches which permit close

rope adjustment and also allow either drum to be used for an unbalanced load. The drums have parallel grooves which accommodate the 1½ in. dia. rope in four layers. The winders are driven through double helical reduction gears manufactured by David Brown and Sons.

Parallel motion suspended brakes of standard design are provided for each drum and are operated by weight brake engines. Both brake and clutch engines are operated by the mine's air supply, but two standby compressors, having an output of 100 cu. ft. of free air per min. and driven by 25 h.p. motors, are installed.

The electrical equipment was designed and manufactured at the Witton Engineering Works. Each winder is driven by two 2,100 h.p., 6.6 kV., 370 r.p.m. slipring induction motors of the protected type with shafts and bedplates extended to permit the stators to be racked clear of the rotors so that inspection and maintenance can be undertaken without dismantling the machine. Since the two motors driving the winder are coupled together through the reduction gearing, and both their stator windings and rotor windings, respectively are connected in parallel, they will share the load equally only if the voltages induced in their respective rotors are equal and in phase. The induced voltages in the rotors will be equal because they are identical machines and are coupled together. It is necessary, however, to take suitable steps to ensure that these voltages are in phase.

Much of the control gear is standard equipment.

DYNAMIC BRAKING AND CONTROL SYSTEM

From the electrical viewpoint, the main interest of this installation centres round the method of control and dynamic braking employed. It is a closed loop system and in this instance is arranged to give accurate torque control, but it can also be designed for speed control and thus is particularly suitable for fully automatic winders.

It can be shown that: (1) For dynamic braking the

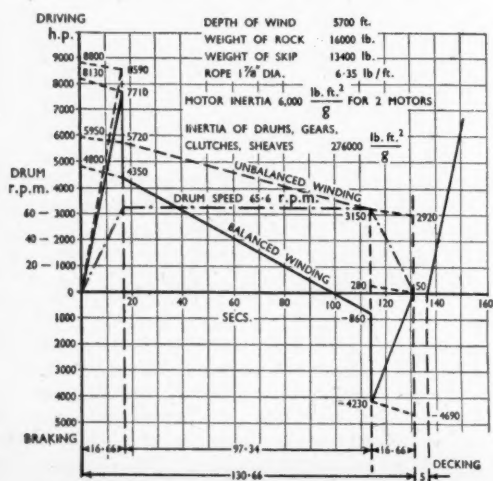


Diagram of hoisting duty when winding rock

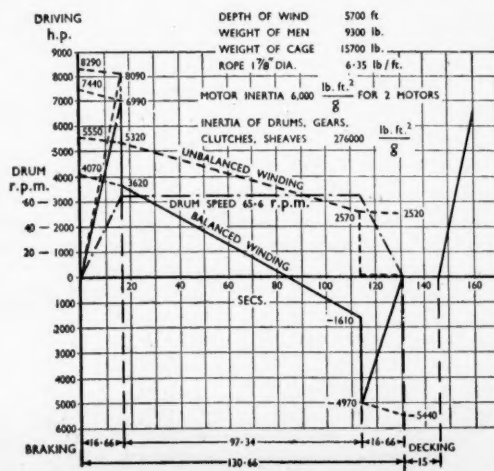
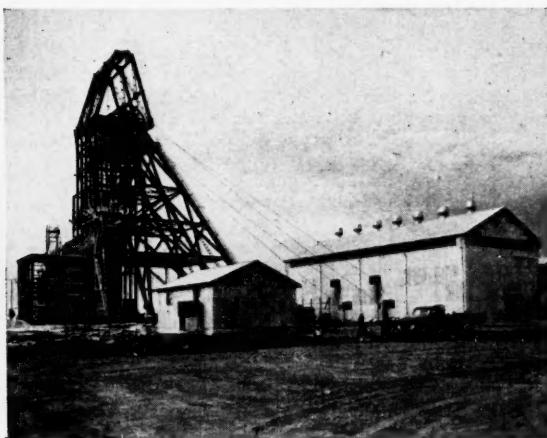


Diagram of hoisting duty when winding men

optimum torque, independent of speed, at any given degree of excitation is developed when rotor circuit resistance = speed $\times K_1$ (a constant); (2) For driving or reverse current braking the torque will be constant and independent of the speed if rotor circuit resistance = slip $\times K_2$ (a constant).

From the foregoing it will be seen that by adjusting the constants K_1 and K_2 , the maximum or any selected torque can be maintained at all speeds with optimum performance of the plant.

Automatic variation of the rotor circuit resistance to comply with the above requirements is effected through



The headgear and winder house

the medium of an oil servo mechanism, the operating valve of which is governed by two control coils, acting in opposition to each other. The coil which causes the resistance in the rotor circuit to be reduced is excited at constant voltage and so exerts a constant pull. The other serves to insert resistance and is excited from a control generator which is chain-driven from one of the winder motors.

In the oil servo mechanism, the two contact drums in the centre adjust the value of the resistance in the circuit of the variable pull control coil, while the drum controller at the right actuates the main rotor resistance contactors. The complete assembly forms a totally enclosed unit.

OPERATION OF THE SYSTEM

In a study of the operation of this control system, it is necessary to consider first the sequence which occurs when winding. When the winder is at rest all the rotor resistance and control coil resistance is in circuit. A small initial movement of the driver's lever causes the forward or reverse contactors to close and connect the stators of the winding motors and the rotor of the control generator to the three-phase supply, so that the voltage induced in the stator of the control generator will be proportional to the slip.

At the instant of starting, the voltage of the control generator is at its maximum, and consequently the voltage applied to the relevant coil allows predominance by the coil, and rotor resistance is restarted at maximum value. Further movement of the driver's lever alters the tapping on the variable transformer with consequent reduction of voltage across the relevant coils and reduces rotor resistance until its value corresponds to the torque represented by the lever position. Simultaneously, it reduces the value of the control resistance and initiates forces which balance the values of the two coils, and the servo mechanism is brought to rest. Thus contactor resistance is speedily adjusted to suit chosen starting torque and thereafter slowly decreases automatically as the voltage of the control generator decreases with increasing speed until contactor

resistance is at its lowest value and the winder motors reach full speed.

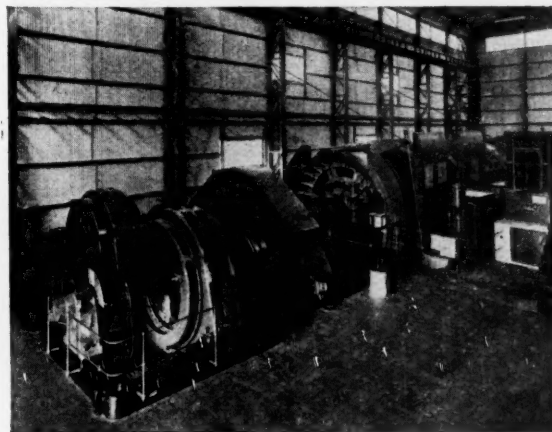
As the wind proceeds the weight of the over-hanging rope overbalances the load so that the winder tends to accelerate and weak dynamic braking is applied with the driver's lever in its first braking position in order to keep the speed constant. As the lever is moved to dynamic braking, the running contactors are opened and the dynamic braking contactors closed so that excitation of winder motors, stators and control generators rotor takes place. Thus the voltage of the control generator becomes directly proportional to the speed of the winder motors.

Near the end of the wind, the driver's lever is moved to its full braking position and maximum dynamic braking is applied. At this instant the control generator is giving maximum voltage. At the same time the position of the driver's lever is such that the variable transformer gives a reduced voltage and maximum excitation is applied to the stators of the winder motors. Control and rotor resistances are reduced until their values correspond with the requirements of excitation and speed.

As the speed of the winder drops due to the braking effort, the voltage of the control decreases so that reduced current in the coils reduces the rotor resistance. Thus the braking effort is maintained independently of speed until finally the rotors are short-circuited and the winder is brought almost to rest so that it can be stopped accurately at the decking position by the mechanical brakes.

OUTSTANDING FEATURES

This control system possesses certain features which may be summarized as: (1) When either winding or braking dynamically, the maximum permissible torque cannot be exceeded however the driver's lever is operated so that there is no fear of overstressing the plant. Furthermore, the maximum torques for driving and for dynamic braking can differ if desired; (2) The extent to which the driver's lever has been moved from the neutral position determines the



Inside the winder house. One of the two 4,200 h.p. winders is in the foreground

value of the torque applied either for driving or dynamic braking; (3) When using dynamic braking, the resistance in the rotor circuit is always at its optimum value, so that the currents flowing in the stator and rotor windings are as small as possible and losses and heating are thus minimized; (4) Excessive movement of the driver's lever cannot result in a reduction of the braking torque; (5) Long periods of braking at low speed, as required for shaft inspection, can be undertaken with a minimum of heating of the winder motor; (6) Maximum braking torque can be maintained down to very low speeds.

Correspondence

TRENDS IN METAL MINING

To the Editor, *The Mining Journal*.

Sir,—We have been interested to read the article by Mr. J. B. Richardson, A.R.S.M., M.I.M.M., on page 71 of the Annual Review, May, 1953, the article in question headed "Trends in Metal Mining."

In paragraph two under the heading "Drilling," we note there is mention that "British Rock Drill manufacturers were not slow in following the Swedes to produce pneumatically operated leg supports for light jackhammers," a paragraph which seems to suggest that the pneumatic leg support or air leg is something of comparatively recent origin.

We would just like to remark, for the record, that we have here been offering pneumatic drill supports or air legs for over 20 years past, from which you will see that the air leg is, in fact, not a new innovation. Unfortunately, because our offices were completely destroyed by enemy action during the late war, we are without many of our records of pre-war days but, without giving too much thought to the matter, the writer recollects that among the people to whom we supplied air legs, several years before the outbreak of the late war in 1939, were such collieries as Treeton (Yorkshire), Cardiff Collieries (Glamorgan), Haydock Collieries (Lancashire), Levenson Wallsend (Durham), etc.

It should be commented that in those earlier days the official reaction to the air leg was vastly different to the reaction of the present time. Then, the tungsten carbide tipped percussive drilling bit had not been developed, and the air leg was put forward more or less solely as a means of taking drilling strain off the operator, and without the present day advantage which the tungsten carbide bit offers on the "combination" of light drill, air leg, and tungsten carbide drilling bit. Our experience was, in the years before the war, that the air leg tended to be looked upon as something of a "luxury," and it was "rather unnecessary to aid the driller in that way."

However, you will see the point that we are making, viz., that unlike what is generally believed, the air leg, or pneumatic drill support, is not a post-war development, but something which we at least, here, have been actively putting forward for a very long period.—Yours faithfully,

H. T. STEER.

May 18, 1953.

Managing Director,
The British Flottman Drill Co. Ltd.
Allensbank Works, Cardiff.

REVIEWS

The Liassic Ironstones, by T. H. Whitehead, M.Sc., A.R.C.S., W. Anderson, M.Sc., Vernon Wilson, Ph.D., M.Sc., D.I.C., and D. A. Wray, Ph.D., M.Sc., with contributions on petrology by K. C. Dunham, D.Sc., S.D. Published by H.M. Stationery Office. Pp. 211 with illustrations and index. Price 25s. net.

In a preface, it is pointed out that the volume under notice is one of a series of memoirs setting out the results of work on the Mesozoic iron ores conducted by the Geological Survey since 1939. The work opens with a general introduction embracing such matters as stratigraphical distribution, locations and structures, and consequent chapters deal in turn with the petrology of the Liassic ironstones, the Liassic iron ores of the Cleveland district, the Frodingham ironstone of Lincolnshire, the Marlstone rock bed ironstone of Lincolnshire and Leicestershire, and the Marlstone rock bed of the North Oxfordshire, South-West Northamptonshire and South-East Warwickshire area.

Ironstones of Liassic age were the first of the Mesozoic ores to be exploited on any considerable scale in England. Apart from minor operations, the earliest workings in them were in the Cleveland district of North-East Yorkshire. Iron compounds are widely distributed in the Lias, but only at a few horizons and in certain localities are they concentrated in definite beds of more than trivial thickness. The result of considerable research and now presented in a clear and concise form, the work does credit to all concerned with its production.

In our issue of April 17, 1953, a review of *Statistical Summary of the Mineral Industry* indicated that the work had been published by the Colonial Geological Surveys Mineral Re-

sources Division. This should, of course, have read H.M. Stationery Office.

Diamond Drill Handbook, by J. D. Cummings, B.A.Sc., P.Eng., Published by J. K. Smit and Sons of Canada Ltd. Pp. 501 with illustrations and index. Price 70s.

In a foreword it is explained that the work under notice is intended for the engineer and geologist, the student, mine manager or exploration company and investor who "wishes to understand the relationship of diamond drilling to exploration and mine development and to evaluate drilling terms used in reports and in the mining press."

In the main, the book covers the application of diamond drilling to the special conditions found in the Canadian Pre-Cambrian Shield. Its particular emphasis is directed towards the metal mining field, with applications of the practice to coal mining or oil exploration being contained in briefer references.

Opening with remarks on the history of diamond drilling, the work continues to describe the uses of the diamond drill and certain drilling methods, before continuing to describe interesting features of a diamond drill, the diamond and bits for diamond drills. The author then discusses overburden, core recovery and attendant matters and a myriad of other aspects of diamond drilling practice such as the surveying of drill holes, costs and statistics, and the exploration and estimation of ore bodies from diamond drilling operations.

The Mine, by T. Rumsey Hamber. Cassell. Pp. 213. Price 10s. 6d. net.

For those who feel inclined towards a busman's holiday, the novel under notice provides goodly light reading. The Mankwa Gold property is situated in the jungles of the Gold Coast, and the story contained in these pages is a record of the hopes, loves and inspirations of the international personnel on the pay roll. It is fictional, but is based on the author's memories of the area, and is possessed of a background of solid mining knowledge.

The work itself comprises more a group of short stories than a series of novel chapters, and of particular interest are the continual references by speaking characters to the subject of African-European relations. The problem is recognized as being of importance, despite the fact that the story is set in the earlier days of the present century. It is in these instances that the book rings its truest note, for anyone who has worked on an African mine will be able to recall similar utterances to those voiced in *The Mine*. The book holds a real appeal.

Woods Practical Guide to Fan Engineering.—Edited by W. C. Osborne, B.Sc.Eng.(Lond.) and C. G. Turner, D.A.A. Published by Woods of Colchester Ltd. Pp. 227 with illustrations and index. Price 10s. 6d. net.

A notice on the fly leaf points out that relatively few books have been written to present the basic principles of the operation and selection of fans in concise and readable form. This, then, is the purpose of the work under review.

By first discussing those air conditions which are necessary for human well-being, the composition of air, body odours, heat loss of the body and stimulating conditions, the author lays the case for the necessity of efficient ventilation in industry. From that point he describes in turn the various aspects of humidity, ventilation requirements, air motion and distribution by means of ventilation systems, and finally approaches the crux of his subject by chapters dealing with fume and dust extraction, evaporative cooling, air duct design, fans, and the selection of fans, among the many subsidiary subjects discussed which relate to the overall conception.

His notes on anemometers are particularly interesting, and the work is interspersed by comprehensive sketches and diagrams that enhance the value of the whole. A valuable work.

The Measurement of Particle Size in Very Fine Powders.—Four lectures delivered at King's College, London, by H. E. Rise, Ph.D., M.Sc., A.C.G.I. Published by Constable and Co. Ltd. Pp. 127. Price 9s.

The four lectures which comprise the work under notice deal with particle size measurement necessary for the control of products or processes, size frequency determination, the theory of the photo-extinction method of size frequency determination, and specific surface by various methods and tests. The whole comprises an interesting book.

MACHINERY AND EQUIPMENT

New Methane Gas Sampling Unit

The development of a new instrument that will continuously sample the atmosphere of coal mines for methane gas, has just been announced by Mine Safety Appliances Co., America. The instrument, a combination analyzer and alarm, was shown at the American Mining Congress Coal Show in Cleveland on May 11 to May 14. Designed primarily for use in mine ventilation systems, the instrument takes samples of return air and automatically analyzes them to detect presence of methane gas. It can sound an alarm, visible and audible, when the predetermined concentration of methane is present in the sample.

Methane gas, being colourless, odourless and tasteless, is the product of decomposition of organic matter. Pockets of this highly explosive gas may be encountered in coal seams, both bituminous and anthracite. When methane explodes, the concussion shakes loose any coal dust present. This may ignite and set off a chain reaction or wide propagation of the blast. Most modern coal mines, however, use equipment to spray rock dust on underground roof, wall and floor to prevent propagation of a coal dust explosion. Finely ground limestone, when mixed with the coal dust, neutralizes the combustibility of the coal dust in direct proportion to the amount of limestone dust added.

The new detecting instrument can be arranged to sample atmosphere from one or several locations. It also may be equipped with a device that will provide a continuous written record of methane concentration. The principle of the instrument is based upon the same electrochemical theory used in other types of gas detection and alarm equipment developed by M.S.A. The atmospheric sample flows over a heated platinum wire filament which forms part of a balanced electrical circuit. Any methane present is burned on the wire. This increases the temperature and the electrical resistance of the wire, causing the circuit to become unbalanced. The degree of unbalance of the electrical circuit is in direct proportion to the concentration of methane in the sample. When a predetermined concentration of methane, below the explosive range, is detected, an alarm circuit is closed automatically.

This new instrument is intended to supplement small hand-operated battery-powered methane detectors and testers, and any flame safety lamps now being used in coal mines. These instruments are employed for spot-checking face workings, break-throughs, air courses and haulageways.

Advances in Traction Battery Design

Significant advances in the design and construction of Exide-Ironclad traction batteries for electric industrial trucks, locomotives and road delivery vehicles are announced by Chloride Batteries Ltd. The old wood veneer separator, always liable to impose a limit on battery life, has now been replaced by one of Porvic, the new microporous chemically inert material. This forms a continuous diaphragm between the positive and negative plates and has proved in service to be most hardy even under the most arduous working conditions. Porvic separators, over 80 per cent porous, enable the cells to deliver heavy rates of discharge with the minimum of voltage drop.

At the same time, important advances have been made in the antimonial lead alloys used for the plate grids in Exide-Ironclad batteries. These new alloys, evolved as a result of prolonged experiment and research, are highly resistant to corrosion in service and will help to ensure maximum life. Exide-Ironclad positive plates are built up of spines made from the new antimonial lead alloys and enclosed in slitted ebonite tubes. These are held at the top and bottom by antimonial lead castings and the space between each spine and its tube is packed tightly with the active material. When fully formed, the active material becomes a solid but porous mass making perfect electrical contact with the spines. The horizontal slits in each tube allow the electrolyte ready access to the contents yet are so fine that the active material is effectively retained.

Negative plates are of the standard Exide heavy duty pasted type, and when the Porvic separators are inserted they are pressed firmly against the negative plates by vertical ribs on

the ebonite tubes of the positives. This tightly assembled cell element, in its di-electrically tested hard rubber box, would, in fact, be solid but for the electrolyte space left by the circular section of the tubes. Built up into suitably sized battery units, the cells are housed either in hardwood trays with an acid resisting finish or assembled direct into steel containers.

A Centrifugal Screen

The application of centrifugal force to screening units has been tried in the past, for the most part unsuccessfully, mainly owing to the fact that the oversize material was held by that centrifugal force against the screening surface and in effect was blinding it. This basic fault is reported to have been corrected in the Symons V screen, manufactured by Nordberg Manufacturing Co. Gyratory movement is combined with the centrifugal action, so that the screening surface moves away from the oversize particles thus preventing their collection against the mesh. This gyratory action is repeated many times whilst a particle is passing through the unit.

The screen consists of a vertically mounted drum attached to a central shaft which is driven at 980 r.p.m., each revolution imparting a gyration to the screening drum. At the same time, by a special gear arrangement, the drum revolves at 70 r.p.m. only, a 14 to 1 reduction, thus giving 14 gyrations per drum revolution. The machine weighs approximately 2½ tons and is driven by a 5 b.h.p. electrical motor operating with the shaft vertical but arranged for foot mounting to the side of the screen frame, pulley uppermost.

The material to be screened is fed on to the top plate of the revolving drum. This is divided into small pockets from which the material is thrown outwards by the very action of revolution. The force thus applied to the material is in the region of 5 G. Wear on the mesh is at a minimum because particles do not slide on the screening surface. At the moment of impact the material is normal to the path being taken by the mesh and the particles either impinge on or pass through the mesh. Mesh is easily fitted by slackening quick release clamps holding an outer cage, behind which the cloth is wrapped round the circumference of the drum.

The screen can operate under both wet and dry conditions and in the former case, water sprays are fitted inside the drum at the base of the centre shaft, the nozzles being directed at a suitable angle against the cloth. When sprays are used, a "wet base" is provided to remove separately the undersize and oversize material together with the accompanying water. Normally a maximum feed size of ¾ in. may be fed to the screen, this, of course, depending on the material to be handled. Separations can be carried out on cloth apertures ranging from about 4 to 100 mesh. The screen is made in one size only at the present time, the drum being 3 ft. high and 12 ft. in circumference, giving 36 sq. ft. of mesh.

New Emergency Lighting Sets

A new range of self-contained automatic emergency lighting equipments for small buildings is now being produced by Nife Batteries. Known as the Nife-Neverfayle Minor series, these sets can be supplied for either maintained or non-maintained systems. In a maintained system the emergency lamps form part of the normal lighting and are switched over instantly and automatically to the battery as soon as a mains interruption occurs. In a non-maintained system, the emergency circuit is only energized when the mains supply is off.

The Minor units are housed in robustly constructed steel cubicles, the lower compartments containing the 12-, 25- or 50-volt batteries and the upper the control gear and instruments. The smaller types are either bench or wall mounted, whilst the larger models stand on the floor. The Nife batteries supplied are of the nickel cadmium alkaline type. Possessing great mechanical strength, the cells are completely inert on open circuit at normal temperatures and can stand indefinitely without risk of damage. No obnoxious fumes are generated and no specially skilled attention is required.

A Stationary Air Compressor

A stationary air compressor, specially designed for use in those territories where a constant supply of water is unavailable, is the T60R unit, manufactured by Holman Bros. Ltd. The manufacturers state that owing to the absence of external service pipework, the compressor is readily transportable and can easily be coupled to the driving unit. Cooling is effected by means of a closed circuit system which is pressurized to 10 lb. sq. in., and a sectionalized radiator is directly mounted to the compressor, and this includes the inter-cooler elements. In other respects the model under notice is similar to the Holman TM60S, and the majority of the major parts are interchangeable. Losses by evaporation are presented as being negligible, an important factor when operations are being concluded in an arid region.

Two staging air compression is employed in the unit, and is common with all Holman vertically enclosed, reciprocating type, two stage stationary air compressors, the T60R has a balanced crankshaft which reduces vibration, large pressure oiled bearings, a double-acting differential piston, with two working strokes made on each revolution in each cylinder.

In operation of the two stage design unit, the air is drawn through the filter and low pressure inlet valve into the first (low) compression chamber on top of the two-diameter piston as the piston moves on its downward stroke. On its upward stroke the piston compresses this air to approximately one-quarter of the final pressure required and forces it through the low pressure delivery valve, through the intercooler and high pressure inlet valve into the second compression chamber. On its downward stroke the piston compresses the air to the pressure required and forces it through the high pressure delivery valve into the receiver.

The capacity of the cooling system is approximately 27 gals., the air receivers are built to BSS 487-1949, and the pilot valve may be set to unload at any pre-determined pressure. Specifications include a displacement of 612 cu. ft. per min. at a maximum speed of 720 r.p.m. The maximum continuous air pressure is 125 lb. per sq. in., and lubricating oil consumption is 65 hrs./gal., with sump capacity of 6 gals.

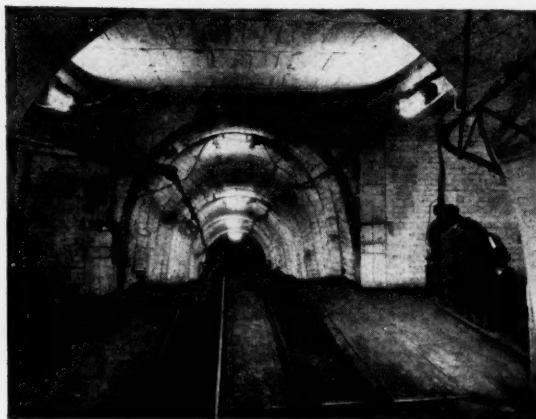
Contribution of Improved Lighting to Underground Efficiency

Section 95 of the National Coal Board Annual Report for 1952 states that better lighting underground can assist in the reduction of the accident rate. This fact carries with it the realization that efficient output is a direct offshoot of a reduced accident rate. Blocked transport roads, incapacitated operatives and broken machinery units can all play a considerable part in hampering a mine's production, considered quite apart from the traditional hazards of ground falls, water fissures, fire and such natural forces.

It is thus obvious that lighting plays a major part in the maintenance of efficient mining operations, and it is of interest to note that the annual report of the N.C.B. continues to state



The top of the main haulage dip near pit bottom at Victoria Colliery appropriately illuminated in the interests of safety



Top end of creepers, near pit bottom at Victoria Colliery, showing electric drives on extreme right and left

that during 1952 the experiments with fluorescent lighting were completed, and managements were informed that they could order certain types of this equipment for installation under suitable conditions. The experiments with tungsten filament lamps for coalface lighting were continued during last year.

An excellent example of underground lighting installations is provided by the fluorescent lighting system established from The British Thomson-Houston Co. Ltd. products in the Victoria Colliery in the North-Western Division of the N.C.B. The lighting system is installed over electrically-driven double creepers close to the pit bottom, and an even level of illumination is provided, and is reported to be particularly valuable where the roadway is used by both men and mechanically-handled tub traffic.

The installation consists of Mazda fittings containing 2 ft. 40-watt fluorescent lamps. These fittings are proof against fire damp and their use in mines is approved by the Ministry of Fuel and Power. Apart from the obvious factors of safety, such illuminations aid ease of operation and facilitate maintenance of machinery.

A Hand Operated Starter

On the Brush Aboe (Ireland) stand, Nos. 251 and 282, at the Dublin Spring Show, held during May, the Berger handraulic starter was displayed fitted to a Petter B4 industrial type water cooled diesel engine. The Berger handraulic starter is hand-operated; it relies on no outside source of energy and it has only three moving parts, two piston rings and a pinion. The starter unit itself comprises two opposed cylinders each containing a piston rack which engages with a simple pinion. This pinion is integral with a toothed dog which engages with a corresponding dog on the engine crankshaft. Two spring loaded balls, one on each side of the starter dog, and running in helical grooves, ensure a forward axial movement of the driving dog and thus effect the engagement of this dog with the engine half dog.

The heart of the starter is the hydraulic accumulator, which consists of a small reservoir containing a flexible diaphragm. The reservoir is filled initially with air compressed to approximately 2,000 lb. sq. in. and it is then sealed. Hydraulic fluid is pumped into the lower part of the accumulator by means of a hand-operated pump, and this compresses the air at the back of the diaphragm to approximately 4,000 lb. sq. in., this is easily operated and it takes no more than a minute or so to recharge.

When the control lever is operated, the energy stored under high pressure in the accumulator is transmitted through the medium of the hydraulic fluid to the starter. A two-stage valve is brought into operation in order to engage the starter with the crankshaft. During the second stage, when the dogs are fully engaged, oil at full pressure is admitted to the heads of the piston racks and the crankshaft is rotated at high speed and with a high starting torque. The Berger handraulic starter is manufactured by Bryce Berger Hodge (Ireland) Ltd.

METALS, MINERALS AND ALLOYS

The London Metal Exchange will close after the morning session of June 1 and will open on June 3.

U.S. Congressional Committee Meetings continue in full spate—11 Senate Committees and Sub-Committees were in session last week and 10 House Committees. What our contemporary, *The American Metal Market*, calls "a most vociferous group of high protectionists" has been marshalling tariff supporters on an intensive scale while top administration officials continue to urge the extension of the present Trade Agreements Act for a year, pending the findings of the Commission proposed by the President in his recent message to Congress. While lead and zinc are the principal targets for tariff revisionists it is obvious that similar arguments would be applied in other directions as for instance copper, were any big reduction in prices to eventuate. The old clichés of U.S. consumers of the destruction of U.S. industry and "gouging" so strongly voiced in the Senate Committees two years ago against foreign tin producers, conjoined with the bogey that without tariff protection foreign cartels would monopolise world markets are once more being resurrected.

The shadow of a possible U.S. steel strike is seen in the offing, but both sides seem inclined to hesitate until the Taft-Hartley Act revision prospects become more clarified. Senator Taft has prepared a comprehensive Bill amending the present law.

It is reported from Melbourne that the Metal Traders Association of Australia has been formed to protect the interests of the metal traders and smelters of Australia and that membership is being widely sought by them.

COPPER.—While the U.S. price is judged to be well stabilized, market activity is dwindling as consumers have generally covered their June requirements, and consuming activity normally declines with the advent of the hot weather. The 7,500 tons of Rhodesian blister imported into the U.S. for refining is now moving to consumers there and a further consignment of 10,000 tons is expected to arrive in the States in the autumn for refining and is likely to be offered to U.S. consumers instead of being returned to the U.K. U.S. consumption in April is computed by the Copper Institute at 116,319 s.tons as compared with 112,992 in March and 106,109 a year ago. Imports into the U.S. for the first quarter of the year are estimated at 163,068 s.tons compared with 130,068 s.tons for the same period last year, an advance of some 25 per cent.

The President of the Chilean Central Bank stated earlier this week that copper export sales were being maintained and had even exceeded production so that stocks there were somewhat reduced. Naturally the export price is unaltered at 35½ c. f.o.b. Chilean ports, and while this condition continues a spokesman of the Japanese smelters said their price for electrolytic, Y.340,000 per tonne, would not be lowered.

LEAD.—Lead has continued to advance on the London Metal Exchange and on Wednesday closed £89½/90 for spot and £83/83½ for forward per ton. In the United States the price was increased to 13¼ c. per lb. N.Y. due largely to the firmness of the London market, but demand was only moderate, sentiment being influenced no doubt by the settlement of the Mexican strikes. During April shipments to domestic consumers were 4,900 tons below that of March at 39,487 s.tons. Over the first four months of the year shipments showed little change; stocks at the end of April had risen to 69,608 s.tons compared with 62,371 at the end of March.

TIN.—The London market has continued to oscillate but the Straits price on Tuesday was £22 7s. 6d. down to £708 10s. In the U.S. the price on Wednesday was 97 c. per lb. The Malayan output in April was 4,576 tons making the four months' output 18,623 tons. Production for the like period last year was 18,573 and for that of 1951, 18,525 tons. There is thus no sign of a decline in output as a result of lower prices so far, and the old experience that when prices decline the Chinaman works harder seems once more being repeated. April imports of concentrates into the Straits were 714 tons (Thailand 512, Burma 153, Indo-China 5 and other countries 44). It is expected in Kuala Lumpur that the Malayan representatives at the next meeting of the Tin Study Group in Brussels on June 15 will support some form of international action designed to effect

price stabilization. An F.M.S. correspondent summarizing local opinion, however, says that it is feared that any form of control or limitation of output might lead to complaints from consumers, that the time is inopportune to suggest such control, and that official interference with production and free marketing is likely to have a psychological effect on consumers which would be to the disadvantage of the long-term interests of producers.

The International Tin Study Group report a startling increase in the Bolivian exports in March to 4,934 tons as compared with 1,469 in January and 1,671 in February. While this remarkable increase may be due in part to a lag in exports, it is also possible that the financial necessities of the Bolivian government may have led to the mining of more high-grade ore: time alone can show. The administrator of the R.F.C. told the Senate Banking and Currency Committee last week that the Agency was now studying the problem of what should be done with the Texas smelter after it ceases to function.

ZINC.—Zinc has, like lead, been firmer on the London market and closed on Wednesday at £70¼/73¼ for prompt and £70¼/73¼ for forward. In the United States, however, the price remained unaltered at 11 c. E. St. Louis, with generally a moderate demand. The Sullivan Mining Company's electrolytic plant, Silver King in the Cour d'Alene, has announced that supplies of concentrates have now been overcome through shipments from other districts and overseas and the full plant will be back in operation about the beginning of next month.

ALUMINIUM.—Aluminium Ltd. has decided that its subsidiary, Alcan, shall reserve 110,000 s.tons of primary metal a year specially for the independent aluminium manufacturers in the United States. This is in line with the policy recently enunciated by Mr. N. V. Davis that their first aim had been to meet the requirements of independent manufacturers in the United States. These requirements have advanced rapidly in recent years from 11,000 s.tons in 1949 to 77,000 s.tons last year. In line with this, two Republican senators have introduced a Bill in Congress to suspend import duty on aluminium for a year from the date when such a law is passed in Congress.

An interesting development in aluminium application has emerged recently. The Reynolds Metals Company showed a non-corrosive aluminium mine car at the recent American Mining Congress exhibition in Cleveland. It is a six-ton capacity car weighing 1,614 lb., only about a third of the weight of a similar steel car. It has been placed in service by the Pocahontas Company, and will, it is hoped, have revolutionary effects on the design and manufacture of mining cars.

CHROME.—An exhibition was recently given to the U.S. Press of the world's largest ferro-alloy plant which Electro-Metallurgical Company, a subsidiary of Union Carbide, is now completing at Marietta, in Ohio. The plant is constructed to produce "Simplex" ferro-chrome which has hitherto been available only in pilot-plant quantities. This alloy is practically carbon-free containing no more than 0.01 per cent. It is an electric furnace product and the furnaces will work continuously. Alloys of manganese and silicon will be produced as well as ferro-chrome. The capacity of the plant is put around 1,500 tons of raw material a day and the ores will be derived from overseas producers including Africa, Turkey, New Caledonia, Cuba and the Philippines.

PLATINUM.—The United States Bureau of Mines reporting on the platinum metals last year gives the total recoveries by refiners last year as 52,475 oz. (platinum 41,810, palladium 6,746, iridium 2,426, osmium 879, rhodium 397 and ruthenium 217 oz.). The total recovery was slightly less than in 1951 when it totalled 53,061 oz. There was a very considerable reduction on the imports of the platinum metals which totalled 452,791 oz. against 601,406 in 1951. There was a considerable decline in both crude and refined material. Crude totalled 35,560 oz. against 63,594 oz., though grains and nuggets which usually include most of the output from Colombia totalled 27,280 oz. against 24,648. Refined platinum imports fell from 267,473 oz. to 202,678, and those of palladium from 239,151 oz. to 200,502. Rhodium declined heavily from 20,665 oz. to 6,151 oz., while ruthenium was down from 6,059 oz. to 2,588 oz.

Iron and Steel

The usual seasonal influences are beginning to operate in the iron and steel industry. There was a slight shrinkage in the production of both pig iron and steel last month and it is significant that although the annual rate of ingot production in the first four months of the year was nearly 18,200,000 tons, the British Iron and Steel Federation's forecast for the year is no more than 17,500,000 tons. On a comfortable 52-week basis this would represent an increase over 1952 of 1,360,000 tons which should suffice to satisfy home requirements and make possible an appreciable reduction in high priced imports of steel.

Curiously enough, imports of Continental and American steel are still maintained at a very high level and contracts for further substantial tonnages have recently been arranged. Apparently British steel makers do not find it profitable to produce soft billets and the bulk of this material supplied to the re-rollers is of foreign origin. To relieve the immediate shortage of steel plate consignments from Austria are expected to come to hand very shortly, and no effort is being spared to achieve an immediate expansion of home production.

An improvement in the supply of sheets and strip has been a material factor in the rising output figures of the motor trade and engineers, boiler makers, wagon builders and power plant producers provide strong support for the heavy steel mills. There are, however, a few dull patches mainly confined to light engineering products. A somewhat lessened home demand for sheets has been offset by the active interest of U.S., Canadian and South American buyers who have placed orders for deliveries up to the end of the third quarter. Bar re-rollers are not almost wholly dependent upon the home trade, and, in fact, the volume of exports of all classes of iron and steel has fallen short of anticipation.

The London Metal Market

(From Our Metal Exchange Correspondent)

The tin market has been featureless except for the violent price movement in the East over the week-end: the reason for this is obscure, and the London market took little notice of the fluctuations when it re-opened on Tuesday. Stocks in the U.K. have once more increased, and the backwardation has again disappeared temporarily. The Eastern price on Thursday morning was equivalent to £759½ per ton c.i.f. Europe.

The May position in the lead market has developed into one of exceptional tightness, which is reflected in the large backwardation now being paid and in the fact that the June price stands only about 25s. above the August quotation. Demand in all parts of the world has been considerably better during the last few days and prices both in London and New York firmed up, but it is not expected that the price trend will remain upwards when the influences of the summer season begin to operate.

The zinc prices declined towards the end of last week, and this brought in a fair consumer demand after the holidays which resulted in the price firming up. The May position is not causing any difficulties, and the trend towards a backwardation which appeared last week did not develop.

The copper market remains steady with good demand throughout the world, and it is not expected that much alteration will take place in the near future. It is believed that the Committee of the London Metal Exchange will finish its deliberations on the new copper contract in the next few days, and that drafts will then be sent out to interested parties before a final decision is taken on its exact form.

Closing prices and turnovers for the week are given in the following table:—

	May 21		May 28	
	Buyers	Sellers	Buyers	Sellers
Tin				
Cash	£747½	£752½	£725	£727½
Three months	£737½	£742½	£725	£727½
Settlement				
Week's turnover	£750 560 tons		£727½ 480 tons	
Lead				
Current month	£87	£87½	£90½	£91
Three months	£82	£82½	£81½	£81½
Week's turnover	£5,600 tons		£4,950 tons	
Zinc				
Current month	£71	£71½	£68½	£69
Three months	£71	£71½	£69½	£69½
Week's turnover	3,800 tons		3,375 tons	

U.K. METAL & MINERAL IMPORTS—APRIL 1953

	Units	April 1953	Jan.-April 1953	Jan.-April 1952	Increase or decrease in 1953 over 1952
Non-ferrous metals and manufactures :					
Aluminium and alloys..	Cwt.	100,243	1,364,423	728,146	-636,277
Bismuth*	Lb.	68,379	170,390	172,554	+ 2,164
Cadmium**	Lb.	49,311	653,104	178,633	-474,471
Cobalt and Alloys**	Lb.	NIL	990,292	1,014,588	+ 24,296
Copper Electrolytic	Cwt.	407,700	1,417,980	1,450,527	+ 32,547
Other sorts	Cwt.	180,044	110,212	811,760	+701,548
Lead	Cwt.	284,354	1,490,280	990,446	-499,834
Mercury	Lb.	180,248	336,611	629,140	+292,529
Nickel	Cwt.	8,832	38,429	51,514	+ 13,085
Tin	Cwt.	2,120	43,600	15,669	- 27,931
Zinc	Cwt.	383,098	1,397,300	1,476,272	+ 78,972
Ores and Concentrates :					
Antimony ore and conc.	Tons	1,383	10,033	3,453	- 6,580
Bauxite	Tons	19,528	93,792	100,701	+ 7,009
Chromite ore	Tons	13,194	63,734	55,710	- 8,024
Iron Pyrites†	Tons	10,049	119,726	77,173	- 42,553
Manganese ore	Tons	37,111	156,671	174,643	+ 17,972
Molybdenum ore	Cwt.	9,808	29,604	27,694	- 1,910
Nickel ore, conc. & matte	Tons	4,112	10,946	12,016	+ 1,070
Tin ore and conc.	Tons	6,471	17,203	13,952	- 3,251
Titanium : Ilmenite	Tons	10,500	36,927	35,182	- 1,745
Other sorts	Tons	588	1,376	2,006	+ 1,170
Tungsten ore	Tons	461	2,067	2,190	+ 123
Zinc ore and conc.	Tons	17,073	51,937	71,339	+ 19,402
Non-metalliferous mining products :					
Asbestos	Tons	8,267	33,008	31,029	- 1,979
Magnesite	Tons	1,513	9,483	4,756	- 4,727
Sulphur	Tons	15,872	139,993	70,363	- 69,630

*Excluding bismuth alloys.

†Including cupreous iron pyrites.

**The figures for 1953 are not completely comparable with those for previous years.

MAY 28 PRICES

COPPER

Electrolytic £253 0 0 d/d

TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered,
10 cwt. and over £225 per ton
Crude (70%) £210 per ton
Ore (60% basis) 20s. — 22s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) £483 per ton

OTHER METALS

Aluminium, £161 per ton
Bismuth Osmiridium, £40 oz. nom.
(min. 4 cwt. lots) 17s. lb. Osmium, £65/70 oz. nom.
Cadmium (Empire), 13s. 10d./ Palladium, £7 15s./£8 10s. oz.
14s. 4d. lb. Platinum, £27/£33 5s.
Chromium, 6s. 5d./7s. 6d. lb. Rhodium, £42 10s. oz.
Cobalt, 20s. lb. Ruthenium, £25 oz.
Gold, 248s. f.o.z. Quicksilver, £70 5s./£70 10s.
Iridium, £60 oz. nom. ex-warehouse
Magnesium, 2s. 10½d. lb. Selenium, 30s. 6d. nom.
Manganese Metal (96%-98%) per lb.
£280/£295 Silver 74d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth 30% 5s. 6d. lb. c.i.f.
20% 3s. 9d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 18s. per ton c.i.f.
" " (concentrates) £14 18s. per ton c.i.f.
" " Refractory £14 10s. per ton c.i.f.
Baluchistan Metallurgical .. £16 11s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) World buying 305s. - 315s.
" " .. 352s. 6d. Selling
" " .. World buying 290s. - 300s.
" " .. 342s. 6d. Selling
Tungsten Metal Powder .. 25s. 9d. nom. per lb. (home)
(for steel manufacture)
Ferro-tungsten 22s. 10d. nom. per lb. (home)
Carbide, 4-cwt. lots .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. £49 15s. 0d. per ton
Manganese Ore U.K.
(48%-50%) 6s. 1d. per unit
Brass Wire 2s. 7½d. per lb. basis
Brass Tubes, solid drawn .. 2s. 1½d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The period under review includes the Whitsun holiday. While business was fairly quiet, the general tone was much steadier. There was less selling and a certain amount of selective buying added to bear covering. Funds were sharply better. The revenue figures for the past week compare favourably with the similar period last year and the overall deficit to date is some £60,000,000 less. This is due to a big fall in Government expenditure.

Kaffir shares were harder supported by a better tone in Johannesburg. French buying was reported following the fall of the Government in France. Another favourable factor was the good development news given at the Anglo American group meetings. Less satisfactory are the dividend estimates for many of the Rand mines due shortly. Increased working costs and the difficult native labour supply position are particularly likely to affect the older mines. This tendency was reflected in share prices. While the recovery in many of the developing Far West Rand mines was pronounced that in the older Central Rand properties was very cautious. Daggafontein rose on the official starting of the uranium plant and Vogels were also noticeably harder on future uranium hopes. Van Dyk fell on reports concerning the chairman's remarks at the meeting. No official details are available in London at the time of writing. The shares after touching their lowest level at 6s. 6d. recovered to 7s.

The O.F.S. presented a much more cheerful picture. Share prices improved all round and President Brand were particularly good on the 100 per cent payability results. President Steyn hardened in sympathy and Loraine also jumped on 100 per cent payability although over a much shorter length. Merriespruit improved on favourable mention in the Middle Witwatersrand report.

In the miscellaneous gold group, conditions were quiet. St. John del Rey were again lower on the reduced profits received from sales of gold due to Brazilian exchange difficulties. It is understood, however, that costs are expected to be lower also.

Diamond shares were better with the general market improvement. Platinums came in for strong demand from Johannesburg. It is rumoured that a dividend announcement can be expected shortly from Potgietersrust. News concerning the use of platinum in the new Shell refinery also helped sentiment.

The copper section reflected the increased attention being paid to base metal shares. The trend in Wall Street and the lack of sellers also brought about better feeling. It seems clear, however, that many investors are adopting a wait and see policy until a free market in the metal is fully established next August.

Tin shares were mainly better. Siamese were particularly good following the dividend announcement. The market continues to be helped by the metal price. Although this is erratic it does appear to have settled down at a level well in advance of £700 a ton.

In the lead/zinc group, prices were mainly slightly higher but there was no major feature. San Francisco Mines rose on the news that the strike had been settled and that the account and dividend announcements can be expected shortly. Rhodesian Broken Hill improved when the report had made plain the extent and reasons for the decline in profit. The expenditure on the new lead plant is likely to be considerably greater due to increased costs and further extensions and improvements.

In the miscellaneous base metals section, manganese shares came into demand. Turner and Newall hardened on the announcement of 2½ per cent interim dividend payable on the double capital. This compares with 5 per cent last year. Consolidated Murchison eased the turn. The March quarterly report shows the sharp increase in net profits to £92,903 as against £40,048 in the December quarter. March, 1953, however, still compares unfavourably with the results obtained for March, 1952, when the price of antimony was very much higher. The chairman stated that if at any time it should be deemed desirable to suspend antimony production, it would be possible to continue with the mining and milling of gold ore.

FINANCE		Price May 27	+ or - on week
African & European...	2½		
Anglo American Corp.	6½		
Anglo-French	17/9		
Anglo Transvaal Consol.	22/6		
Central Mining (£1 shrs.)	28/9		
Consolidated Goldfields	45/-		
Consol. Mines Selection	24/4½		
East Rand Consols.	3/-		
General Mining	40/-		
H.E. Prop.	7/6		
Henderson's Transvaal	58/3		
Johnnies	34		
Rand Mines	32/6		
Rand Selection	35/9		
Strathmore Consol.	27/6		
Union Corp. (2½ units)	33/1½		
Vereniging Estates	46/3		
Writs			
West Wits			
RAND GOLD		Price May 27	+ or - on week
Blyvoors	41/-		
Brakpan	10/3		
City Deep	22/6		
Consol. Main Reef	33/9		
Crown	38/-		
Daggas	26/-		
Doornfontein	38/9		
E. Daggas	16/10½		
E. Geduld (4½ units)	33/1½		
E. Rand Props	24/-		
Geduld	13/9		
Grootvlei	22/3		
Libanon	11/-		
Luppaards Vlei	21/6		
Marievale	21/10½		
Modderfontein East	22/-		
New Kleinfontein	42/-		
New Pioneer	10/3		
Randfontein	14/4½		
Robinson Deep	5/-		
Rose Deep	5/4½		
Simmer & Jack	27/6		
S.A. Lands	2½		
Springs	7/-		
Stifffontein	14/-		
Sub Nigel	14/-		
Van Dyk	33/3		
Venterspost	53/9		
Vlakfontein	47/6		
Vogelstruif			
West Driefontein			
W. Rand Consolidated			
Western Reefs			
O.F.S.		Price May 27	+ or - on week
Freddies	12/3		
Freddies N.	11/6		
Freddies S.	21		
F. S. Geduld	15/9		
Geoffries	25/6		
Harmony	9/9		
Loraine	11/6		
Lydenburg Estates	8/6		
Merriespruit	17/6		
Middle Wits	38/1½		
Ofists	25/9		
President Brand	23/3		
President Steyn	13/-		
St. Helena	13/9		
Welkom	20/3		
Western Holdings	3½		
WEST AFRICAN GOLD		Price May 27	+ or - on week
Amalgamated Banket.	1/6		
Ariston	6/6		
Ashtani	21/7½		
Bibiani	6/3		
Bremang	2/6		
G.C. Main Reef	3/6		
G.C. Selection Trust	6/3		
Konongo	2/7½		
Lyndhurst Deep	1/3		
Marlu	3/3		
Taqua & Abosso			
AUSTRALIAN GOLD		Price May 27	+ or - on week
Boulder Perseverance	2/1½		
Gold Mines of Kalgoorlie	11/3		
Falcon Mines	7/9		
Great Boulder Prop.	14/9		
Lake View and Star	17/9		
Mount Morgan	12/3		
North Kalguri	6/3		
Sons of Gwalia	7/7½		
South Kalguri	12/-		
Western Mining			
MISCELLANEOUS GOLD		Price May 27	+ or - on week
Cam and Motor	9/7½		
Champion Reef	5/-		
Falcon Mines	7/-		
Globe & Phoenix	24/6		
G.F. Rhodesian	5/3		
London & Rhodesian	4/7½		
Motapa	2/10½		
Myore	2/10½		
Nandysdrong	5/9		
Ooregum	2/9		
Oroville	9/9		
MISCELLANEOUS GOLD (contd.)		Price May 27	+ or - on week
St. John d'El Rey	23/9		
Zams	25/-		
DIAMONDS & PLATINUM		Price May 27	+ or - on week
Anglo American Inv.	20/3xd		
Cast	34		
Cons. Diam. of S.W.A.	66/-		
De Beers Deft. Beare	15½		
De Beers Pfd. Beare	8/9		
Pots Platinum	14/3		
Watervaal			
COPPER		Price May 27	+ or - on week
Chartered	51/9		
Esperanza	3/9		
Indian Copper	4/3		
Messina	34		
Nchanga	64		
Rhod. Anglo-American	47/9		
Rhod. Katanga	9/3		
Rhodesian Selection	12/10½		
Rhokana	17½		
Rio Tinto	19½xd		
Roan Antelope	12/9		
Selection Trust	30/-		
Tanks	57/6		
Tharisa Sulphur Br.	41/3		
TIN (Eastern)		Price May 27	+ or - on week
Ayer Hill	22/6		
Bangrin	7/3		
Gopeng	8/4½		
Hongkong	7/6		
Ipo	14/4½		
Kamunting	8/9		
Kinta Tin Mines	4/9		
Kepong Dredging	10/3		
Malayan Dredging	24/-		
Pahang	13/3		
Pengkalen	7/3		
Petaling	10/6		
Rambutan	11/-		
Siamese Tin	21/3		
Southern Kinta	13/6		
S. Malayan	23/1½		
S. Tronoh	9/4½		
Sungei Kinta	13/1½		
Tekka Taiping	4/9		
Tronoh	21/9		
TIN (Nigerian and Miscellaneous)		Price May 27	+ or - on week
Amalgamated Tin	9/1½		
Beralit Tin	27/-		
Bitichi	4/-		
British Tin Inv.	12/4½		
Ex-Lands Nigeria	3/10½		
TIN (Nigerian and Miscellaneous) contd.		Price May 27	+ or - on week
Geovor Tin	10/-		
Gold & Base Metal	3/6		
Jantar Nigeria	13/6		
Jos Tin Area	13/-		
Kaduna Prospectors	2/9		
Kaduna Syndicate	3/-		
London Tin	4/10½xd		
United Tin	2/6		
SILVER, LEAD, ZINC		Price May 27	+ or - on week
Broken Hill South	41/10½		
Burma Mines	1/6		
Consol. Zinc	24/6xd		
Lake George	9/4½		
Mount Isa	33/9		
New Broken Hill	18/4½		
North Broken Hill	50/7½		
Rhodesian Broken Hill	10/9		
San Francisco Mines	22/6		
Uruwira	2/9		
MISCELLANEOUS BASE METALS & COAL		Price May 27	+ or - on week
Amal. Collieries of S.A.	45/6		
Associated Manganese	47/3		
Cape Asbestos	20/4½		
C.P. Manganese	51/3xd		
Consol. Murchison	26/-		
Mashaba	74d		
Natal Navigation	3		
Rhod. Monteleo	8/9		
Turner & Newall	49/6		
Wankie	13/10½		
Witbank Colliery	3½		
CANADIAN MINES		Price May 27	+ or - on week
Dome	\$35½		
Hollinger	\$25½		
Hudson Bay Mining	\$79½		
International Nickel	\$71½		
Mining Corp. of Canada	\$44		
Noranda	\$124		
Quebec	\$6½		
Yukon	\$310½		
OIL		Price May 27	+ or - on week
Anglo-Iranian	5½		
Apex	40/-		
Attock	26/3		
Burmah	45/7½		
Canadian Eagle	32/3		
Mexican Eagle	21/1½		
Shell (bearer)	4½xd		
Trinidad Leasehold	24/6xd		
T.P.D.	21/3		
Ultramar	22/10½		

COMPANY NEWS AND VIEWS

Rio Tinto Forms New Canadian Subsidiary

Although Rio Tinto is usually viewed as being primarily a holding company, its exploration activities in recent years have brought this side of its business well to the fore.

One of its most recent ventures is the forming of a subsidiary in Canada known as Ownamin Ltd. with offices in Toronto. This company will act as Rio Tinto's exploration arm in Canada for which purpose it has been provided with an initial budget of approximately \$200,000 a year to investigate properties and to make preliminary examinations. Ownamin's first Canadian participation, according to a recent issue of *The Northern Miner*, is via Area Mines Ltd. in that company's Holland Township block of 101 claims in the Gaspe copper area where it has agreed to spend a minimum of \$150,000 on exploration by the autumn of 1955. This property lies a few claims east of Noranda's Gaspe Copper Mines and it is anticipated that about two-thirds of the funds so allocated will be devoted to geo-physical surveying, the remainder to be expended on preliminary diamond drilling of the more interesting locations.

The formation of this Canadian company is referred to in the Annual Report and Accounts of the Rio Tinto Company for the year 1952 which showed that the consolidated net return on sale of produce, etc., during the year was £1,534,194 against £1,042,850. After providing for expenses of administration, taxes, etc., depreciation on plant in Spain and in the U.S.A., and all other charges, the profit for the year was £323,934 compared with £183,060. To this figure was added investment income of £339,630 (£778,019), and sundry interest of £7,762 (£735), making £731,326 (£961,814) available.

Owing to the "shattering effect of taxation" the company has cut the bonus on the ordinary by 15 per cent to 5 per cent, tax free, so that with the dividend maintained at 15 per cent, the total distribution for the year was 20 per cent, tax free, against 35 per cent, tax free. Contingencies reserve received £200,000 and the carry forward at the fiscal year end was £1,196,638 compared with £1,128,157 brought in.

Although the gross yield on the company's Rhodesian investments was well maintained, the full impact of profits tax and E.P.L., since the emigration of the companies concerned falls entirely on the company. This resulted in a very considerable fall in the net income from these investments. Moreover, the company, in common with others with similar holdings, is unexpectedly being held liable by the Inland Revenue for profits tax on that portion of 1951 dividends paid by the Rhodesian companies in respect of the period before the end of 1950, when they were still resident in the United Kingdom. This explains the allocation of £20,000 to a contingencies reserve out of the current year's profits.

The Earl of Bessborough is Chairman. Meeting, June 11.

Burmah Oil Corporation Pays More

A preliminary profit statement issued by the Burmah Oil Company for the year 1952 announced a final dividend of 12½ per cent making 15 per cent for the year. This distribution was paid on the present ordinary capital of £20,604,770 as increased by the 50 per cent scrip issue, and does, therefore, compare favourably with the 21 per cent paid in 1951 on ordinary capital of £13,736,513, which is equivalent to only 14 per cent on the present capital.

Year to Dec. 31	Group Profit	Taxation	Net* Profit	Divi- dend %	To Reserve	Carry Forward
	£	£	£		£	£
1952	7,613,260	4,741,422	2,871,838	15†	1,018,257	596,047
1951	9,601,696	6,240,705	3,360,991	21‡	1,650,000	586,981

* After all charges including U.K. and overseas taxation.

† Paid on ordinary capital of £20,604,770.

‡ Paid on ordinary capital of £13,736,513.

This payment should please shareholders as it will be recalled that the chairman at the last annual meeting did not foster hopes of any increase in the dividend payments following the scrip issue. His firm statement in this regard rested on the fact that the company's large capital programme, planned for the next 5 or 6 years, will cost around £20,000,000-£25,000,000, and also the company had to bear the additional burden of E.P.L.

Rhodesian Broken Hill Reduces Dividend to 40 Per Cent

With an operating profit of £2,805,843 for 1952, the Rhodesian Broken Hill Development Company registered a decline of approximately 50 per cent in earnings before tax in the previous year, which amounted to £5,777,768. This decrease was, of course, due to the substantial fall in the prices of both lead and zinc from the high levels attaining in 1951, which enabled the company to announce record profit figures.

Year to Dec. 31	Metal Sales	Mining Costs	Tax	Net Profit	Divi- dend	To Reserves
	£	£	£	£	s. d.	£
1952	4,462,207	1,216,947	996,063	1,791,364	2 0	500,000*
1951	7,770,386	1,158,343	2,139,732	3,609,436	4 6	500,000†

* To capital reserve. † To general reserve.

Sales of metals and manufactured goods at £4,462,207 was the chief revenue bearing item comprising the total income for the year of £4,732,835. Mining and manufacturing costs at £1,216,947 were satisfactory considering that zinc production increased by 300 tons to 22,890 tons and lead output at 12,600 tons was not far short of the previous year's output of 13,970 tons. One compensatory feature of the lower price levels prevailing was the reduction in the charge for mineral royalties which at £401,580 represented an appreciable decline from the 1951 charges of £929,917. Tax liabilities were also much reduced and both of these items provided a reasonable shock absorber to the appreciable reduction of over £3,000,000 in metal sales proceeds.

The allocation of £500,000 to reserve conforms to the board's policy of financing capital commitments primarily out of profits. The £500,000 is intended firstly to provide funds for the new lead plant, and for further capital expenditure to be incurred in the current year which will involve erecting a lead de-silverizing plant to ensure lead production of the highest purity. It is also intended in the near future to erect a plant for the production of refined cadmium which has not hitherto been recovered.

Net earnings after tax came out some £1,800,000 lower and accordingly the total dividend distribution per 5s. stock unit on the £3,250,000 issued capital was cut back from 90 per cent to 40 per cent, which required £1,300,000, leaving the forward balance at the fiscal year end slightly lower at £377,709 compared with £386,345 brought in.

Sir Ernest Oppenheimer is Chairman. Meeting, June 13.

Consolidated Murchison Good March Profits

Consolidated Murchison (Transvaal) Goldfields and Development has announced an estimated profit for the March quarter of £124,903, including gold premium sales, compared with £47,048 in the December quarter of last year.

Results for the last four quarters are given in the following table.

Qtr. 1952	Tons Crushed	Profit* £	Premium Revenue £	Tax (Est.) £	Net Profit £	Capital Exp. £
June	22,267	97,066	830	16,000	81,896	36,281
Sept.	23,670	64,534	314	10,000	54,848	2,321
Dec.	19,984	46,299	749	7,000	40,048	3,024
Mar.†	15,100	124,711	192	32,000	92,903	31

* Estimated profit from antimony and gold. † March quarter, 1953.

In the annual report now issued, covering the year 1952, the chairman, Mr. S. G. Menell, said that on the basis of the present price and demand for antimony ore it is anticipated that the estimated profit will be substantially the same for the June quarter. However, after June 30, he added, a considerable reduction in the rate of profit must be expected unless demand for this metal improves. Moreover, should demand fall away sharply, Mr. Menell, in his annual statement, said that antimony production could be suspended and mining operations continued with the mining and milling of gold ore.

The excellent profit figure returned for the March quarter, together with the chairman's assurance of a similar earnings figure for the June quarter, came as a pleasant surprise to the market and current feeling is that next month's interim dividend will be maintained at 3s. 6d.

New Era's Big Profit

The New Era Consolidated is one of the unpretentious members of the Anglo American group, which has been a consistent dividend-payer for many years. Its functions are that of mining-finance, it has built up a very interesting portfolio of shares, many of them in companies of "Anglo's" group, from which it has derived revenue by way of dividends. It also derives income from share dealings and other sources and for many years to 1951 revenue enabled it to distribute to shareholders 22½ per cent. For 1952 the amount was raised to 25 per cent and the annual report for the year discloses the reason. Towards the end of 1952 Epoch Investments Ltd., at the time a wholly-owned subsidiary, disposed of its investments and declared a dividend representing its accumulated profits. The result of this is reflected in New Era's profit and loss account which shows revenue during the year, amounting to £614,979 compared with £197,567 in 1951. After receipt of the dividend New Era disposed of the majority of its shares in Epoch Investments which is no longer a subsidiary undertaking.

Mainly through its holding in West Rand Investment Trust the company is interested in mines of the Far West Rand; it has a direct interest in Hartebeestfontein Gold Mining, the first of the two companies to be formed to work the area south of Stilfontein, known as the Lucas Block. Other companies in which shares are held include Brakpan, Daggafontein, Grootvlei, Vaal Reefs and Western Reefs. Orange Free State interests are represented by holdings in Free State Geduld, "Geoffries," "Ofsits," President Steyn and Brand, Welkom and Western Holdings.

"Ofsits" Encouraging Annual

More encouragement is derived from the 1952 annual report of Orange Free State Investment Trust than from that of the previous year. A sharp increase is shown in the company's share investments, revenue is substantially higher and the company wound up the year with a profit as against a loss shown in 1951.

The Trust was formed in 1944 to concentrate all the Orange Free State interests of the Anglo American Corporation and has continued to play an important rôle in the financing of new O.F.S. ventures. The text of its investments in developing mines is reflected in the large increase in the cost of shares and other interests which stand in the balance sheet at £12,945,000 compared with £9,648,000 at the end of 1951. The market value of these investments at the end of 1952 was £20,724,000. Total revenue amounted to £304,259 as against only £68,898 the previous year and was derived from interest, dividends, share dealings and other sources. After allowing for expenses, interest on Registered Notes and Bonds, Loans, etc., there was a profit of £54,550 as against a debit shown in the previous year of £49,380.

The company is interested in all the new Orange Free State mining undertakings from which it is reasonable to expect substantial income by way of dividends when they come to fruition. Meantime, as a result of the scale on which its financing operations have been conducted, its own resources became depleted and additional funds had to be raised—first to the extent of 25,000,000 Swiss francs (approximately £1,920,000); and secondly, to the extent of £1,400,000 in respect of loan facilities made available by Anglo American Corporation and others.

W.R.I.T.'s Mining Spread

The stewardship of West Rand Investment Trust last year was rewarded with satisfactory results; revenue underwent little change at £726,339 but net profit was down at £629,595 as against £645,276. Provision for taxation called for substantially more—£111,000 against £26,500 and the dividend which was maintained at 1s. 4½d. per share absorbed £572,858.

The company's investments which originally constituted the growing interests of the Anglo American Corporation on the Far Western Rand, have greatly increased; they have a balance sheet value of £9,082,804 and their market value at December 31, 1952, taking Stock Exchange quotations where available and directors' valuation, was £19,304,034. During the year the company subscribed for shares in Hartebeestfontein and Ellaton Gold and disposed of some Doornfontein and Western

Reef shares. The portfolio now includes shares in all the Western Rand mining ventures and the chairman, in his statement accompanying the annual report, gives up-to-date information on those of most outstanding interest.

Good values have continued to be obtained from prospecting development on farm Goedgenoeg, which adjoins Western Reefs property and in due course application will be made for the area to be included in the company's mining lease. It is expected that both the uranium and acid plant will come into operation during the third quarter of the current year. Underground work is being carried out at Ellaton and the erection of reduction works has started. At Hartebeestfontein preparatory work to the commencement of shaft sinking is going forward. Good progress is being made at Vaal Reefs which company has agreed to cede mineral rights over 300 morgen of a portion of the farm Zandpan to Hartebeestfontein. In consideration for this it will receive £21,000 in cash and has subscribed for 280,000 shares.

Central Provinces Manganese Pay 6s. Free of Tax

Although the trading profit in 1952 of Central Provinces Manganese Ore Company, after deduction of mines and port expenditure, advanced by £950,378 to £2,887,767, taxation increased by £783,500 so that the net profit for the year rose by only £184,482 to £827,868.

Year to Dec. 31	Total* Income	Expenses†	Taxation	Net Profit	Divi- dend	Forward Balance
	£	£	£	£	s. d.	£
1952	2,942,659	73,791	2,041,000	827,868	6 0	192,604
1951	1,969,444	68,558	1,257,500	643,386	5 0	185,066

* After deduction of mines and ports expenditure.

† Including depreciation of fixed assets of £38,996 (1951 - £37,896).

‡ Free of tax.

The total dividend distribution of 6s., tax free, per 10s. share on the £1,000,000 issued capital, comprised an interim payment of 1s. 3d. (1s.), a final of 2s. 3d. (2s.) and a bonus payment of 2s. 6d. (2s.) which absorbed £600,000 compared with £500,000 in the previous year. The sum of £100,000 (same) was allocated to general reserve, £75,000 (nil) was transferred to contingencies reserve, and after providing £10,000 (same) to the workers' welfare fund and £32,626 (£22,073) to staff funds, the balance remaining to be carried forward was slightly higher at £192,604 compared with £185,066 brought in.

South Crofty Pays 10 Per Cent

From almost every angle South Crofty during 1952 showed a big improvement over the results achieved during the previous year.

Year to S. Crofty		Tons Recovered			Castle-an-Dinas	
Dec. 31	Milled	Black Tin	Wolfram	Arsenic	Milled	Wolfram
	(tons)	(tons)	(tons)	(tons)	(tons)	(tons)
1952	44,182	475	3	63½	7,840	26
1951	28,517	304	5½	Nil	7,390	46

The tonnage throughput was higher as was the tonnage black tin recovered while in addition over 63 tons of arsenic were recovered. At Castle-an-Dinas the company's subsidiary, Great Western Ores, sent more ore to the mill but wolfram output declined by 20 tons to 26 tons.

Year to Dec. 31	Metal Sales	Mine Costs	Taxa- tion	Net Profit	Divi- dend	Carry Forward
	£	£	£	£	%	£
1952	312,261	262,924	29,921	16,698	10	16,352
1951	234,599	230,594	7,339	5,850	5	10,681

Proceeds from sales of its products brought the company in over £312,000, an increase of approximately £78,000 over the preceding year and although no dividend was received from its subsidiary, as against £15,000 gross in 1951, total income for the year amounted to £317,651 against £251,179. Mining costs were some £30,000 higher, an item which must be watched in view of the substantially lower tin prices prevailing, but even so, after providing for depreciation and other expenses, untaxed profits at £46,619 was in sharp contrast to the previous year's figure of £13,189. Taxation liabilities rose sharply but the net profit was almost three times as great as in the preceding year. This was acknowledged by the payment of 10 per cent (5 per cent) which absorbed £6,289, and after taking into account the sum of £7,925 written off mining rights, the forward balance was left stronger at £16,352 compared with £10,681 brought in.

Company Shorts

Selection Trust Pays 42½ per cent.—In a preliminary profit statement issued by Selection Trust, covering operations for the year to March 31 last, the Trust recommended a final dividend of 3s. per 10s. unit, against 3s. 3d. in the preceding year, making a total distribution for the year of 4s. 3d. against 4s. 6d. or 42½ per cent compared with 45 per cent.

The consolidated revenue of the group was derived from dividends and interest of £1,714,061 (£1,572,029), profit on realization of investments of £208,181 (£381,499), and other income amounting to £72,225 (£38,146) making a total of £1,994,467 compared with £1,991,674 in 1951.

Expenses provided out of this total amounted to £95,749 (£87,732) leaving a balance of £1,898,718 compared with £1,903,942.

This sum was appropriated as follows:—

	1953	1952
Taxation	1,145,877	1,007,085
Exploration Reserve	150,000	150,000
(Investment Reserve)	—	170,000
*Preference Share Redemption	2,500	2,500
*Preference Dividends	23,625	23,625
Interim Dividend	147,157	147,157
Final Dividend	369,996	382,610
Added to "Carry Forward"	59,563	20,965

* These items refer to the 1,000,000 preference shares of Seltrust Investments Ltd. not held by Selection Trust Ltd.

The unappropriated profits carried forward are increased by the above additions from £331,028 to £390,591.

Net appreciation amounting to £4,328 (£79,155 depreciation) in the value of certain investments has been added to investment reserve, increasing the balance to £270,774 (£266,446).

Expenditure on exploration amounting to £107,833 (£61,283) has been charged to exploration reserve and, as shown above, £150,000 (same) has been transferred to it out of profits, increasing the balance to £346,009 (£303,842).

The report and accounts will be posted to stockholders on June 16 and the annual general meeting will be held on July 9. Mr. A. Chester Beatty Jnr. is chairman.

Current Information on F. S. Geduld, President Brand and Loraine.—Mr. H. F. Oppenheimer at the annual general meetings of Free State Geduld, President Brand and Loraine Gold held in Johannesburg on May 26, announced details of development work at the mines of these three companies since the issue of their quarterly reports.

With regard to Free State Geduld, Mr. Oppenheimer said work on the consolidation of the concrete plug in No. 2 shaft has proceeded satisfactorily, and on May 22 development started on the 5,100 ft. level.

At the President Brand meeting he said that the basal reef had been intersected on the 4,400 ft. level, and of a total of 240 ft. developed 220 ft. were sampled of which 100 per cent proved payable averaging 183.27 dwt. over 4.09 in., equivalent to 750 in. dwt.

At the Loraine meeting he said that development since the end of the quarter had been started on several levels. On the 4,800 ft. level station, at which elevation the reef was intersected in the shaft, the basal reef was exposed over 50 ft. all of which were sampled and proved payable averaging 34.85 dwt. over 9.60 in., equivalent to 335 in. dwt. Development of the reef in this area will, however, be discontinued whilst the station crosscuts and boreholes are being excavated.

London Tin Corporation Earns and Pays More.—The preliminary statement issued by London Tin Corporation covering operations for the year ended April 30, 1953, estimates that the net profit for the year would be in the neighbourhood of £445,000, an increase of nearly £30,000 over the preceding year. This net figure, however, was struck after paying approximately £186,930 more in taxation. The dividend of 22 per cent is declared as an interim dividend but the preliminary statement announces that it will not be the intention of the company to recommend a final dividend when the accounts are issued. The dividend will be paid on June 23.

Year to Apr. 30	Working Profit	Taxation	Net Profit	Dividend	Distribution
	£	£	£	%	£
1953	1,355,000	910,000	445,000	22	437,806
1952	1,139,577	723,070	416,507	20	379,915

The accounts will be issued as soon as possible after the receipt of the subsidiary companies' figures from abroad and the completion of the audit. It is hoped to hold the annual meeting in September. Mr. J. Ivan Spens is chairman.

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EAST GEDULD MINES, LIMITED

Mr. P. M. Anderson, the chairman of the company, in addressing members at the annual general meeting held at Johannesburg on May 19, 1953, said that the average price received by the company for the whole output of gold during the year under review was 255s. per oz. fine, or 5s. 8d. less than in 1951.

He stated that the tonnage milled in 1952 at 1,725,000 tons was slightly less than in 1951 owing to the shortage of native labour, and as the yield was unchanged at 6.00 dwt. per ton the output at 517,544 oz. showed a small decrease. As a result of this, and the lower price received for gold, the working revenue at £6,616,635 was lower by £194,494 than in 1951. Working costs rose by 1s. 9d. per ton milled and absorbed £2,342,282 so that the working profit at £4,274,353 was £329,760 less than in 1951.

Provision for taxation amounted to £2,313,720 and after taking into account income from investments amounting to £71,068, and the other items detailed in the profit and loss account, the net profit was £2,029,231. Dividends totalling £1,837,500, or 4s. 1d. per unit of stock, were declared, being 3d. per unit less than in 1951. Capital expenditure absorbed £140,381 and the carry forward was £573,494.

The total development footage driven at 14,674 ft. was 1,352 ft. more than in 1951. On the Main Reef Horizon 11,526 ft. were accomplished, of which 7,535 ft. were on reef and sampled, disclosing 3,780 ft., or 50 per cent, payable with an average value of 8.0 dwt. over 23 in. 3,148 ft. were accomplished on the Kimberley Reef Horizon but of the 2,675 ft. on reef and sampled only 175 ft. proved payable.

The recalculated ore reserve decreased by 400,000 tons to 12,000,000 tons, the value and estimated stoping width remaining unchanged at 5.7 dwt. and 51 in. respectively.

During the first quarter of 1953 the ore milled amounted to 400,000 tons and the working profit was £888,321. Premium gold sales brought in an additional £33,531. Development work on Main Reef totalled 1,463 ft. of which 790 ft. were sampled disclosing 480 ft., or 61 per cent, payable averaging 8.2 dwt. over 28 in. Of the 1,095 ft. accomplished on the Kimberley Reefs, 790 ft. were sampled disclosing 130 ft., or 16 per cent, payable averaging 4.0 dwt. over 43 in.

The chairman referred with deep regret to the recent death of Sir Robert Kotze who had been a director of the company for 26 years.

The report and accounts were adopted and the retiring directors, Messrs. P. M. Anderson and J. S. Walker, were re-elected. The Special Resolution amending the Articles of Association in regard to the length of notice of meetings was passed unanimously.

Mining Men and Matters

I.M.M. Presentation Awards.—At the annual general meeting of the Institution of Mining and Metallurgy held yesterday (May 28) the Gold Medal of the Institution was awarded to Sir Ernest Oppenheimer in recognition of his services to the mining and metallurgical industries and to higher education.

Certificates of honorary membership of the Institution were conferred on the Rt. Hon. Lord Baillieu in recognition of his services to the mining and metallurgical industries and of his work as Chairman of the Empire Council of Mining and Metallurgical Institutions; and on Mr. Harry Lionel Sargent in recognition of his services to the Institution and in particular of his work as Honorary Secretary of the Benevolent Fund for 20 years.

'The Consolidated Gold Fields of South Africa, Ltd.' Gold Medal, for 1952 was awarded to Mr. Harold Henry Watson for his Paper on "The Dust Problem in the Kolar Gold Mines" (Transactions: Vol. 61) and 'The Consolidated Gold Fields of South Africa, Ltd.' Premium of Forty Guineas was awarded to Mr. Edward Keith McDermott for his Paper on "Major Changes in Mining Practice During Ten Years 1940-1950, Rhokana Corporation Ltd." (Transactions: Vol. 61).

The 'William Frecheville' Student's Prize was awarded to Mr. David Kear for his Paper on "Mineralization at Castlebar-Dinas Wolfraam Mines, Cornwall" (Transactions: Vol. 61).

Mr. Donald J. Farquharson has been appointed financial consultant to New Union Goldfields and a director of Lydenburg Gold Farms Company, New Witwatersrand Gold Exploration Company and Selected Mining Holdings.

Sir Arthur Smout has been elected a Fellow of the Council of the Institute of Metals in recognition of his long and distinguished services to the Institute. The number of Fellows is limited to twelve.

ST. HELENA GOLD MINES, LIMITED

Mr. P. M. Anderson, the chairman of the company, in addressing members at the annual general meeting held at Johannesburg on May 19, 1953, said that the tonnage milled in 1952, the first full year of production, amounted to 598,000 tons with an average yield of 3.96 dwt. per ton. The working revenue which included a premium of £36,993 received in respect of sales of gold for artistic and industrial purposes, amounted to £1,513,929, or 50s. 8d. per ton milled. Working costs amounted to 46s. 6d. per ton milled, or a total of £1,390,642, so that the working profit for the year was £123,287.

He stated that the net profit was £129,581. From this profit £48,150 was appropriated to cover loan account expenses, £35,640 to write off the debit balance brought forward, and after making provision for the other items specified in the appropriation account, a balance of £8,359 was carried forward.

Expenditure of capital funds during the year totalled £673,900 which included £267,613 in respect of development footage in excess of that charged to working costs. While it was still necessary, in order to strengthen the ore reserve position, to carry out a substantial amount of development and to charge a portion of the cost to capital account, it was anticipated that total capital expenditure during the current year would be well below the 1952 figure.

The development footage driven during 1952 was substantially higher at 65,604 ft. Of the 33,520 ft. on Basal Reef and sampled, 14,485 ft., or 43 per cent, proved payable with an average value of 14.1 dwt. over 22 in., equivalent to 311 in. dwt. Although the value was somewhat lower the greater development footage on reef combined with the higher percentage payability resulted in the payable footage being trebled as compared with 1951.

The ore reserve recalculated as at December 31, 1952, was 1,250,000 tons, or double the amount at the end of 1951, and averaged 5.3 dwt. over an estimated stoping width of 50 in., the value being 0.6 dwt. lower and the width 2 in. more than at the end of the previous year.

During the first quarter of 1953 the scale of milling operations continued to increase. The ore milled totalled 181,000 tons and the working profit was £49,769, to which must be added £10,702 from premium gold sales. 16,099 ft. were driven on Basal Reef, of which 7,015 ft. were on reef and sampled, disclosing 2,870 ft., or 41 per cent, payable averaging 10.3 dwt. over 27 in., equivalent to 277 in. dwt.

In concluding, Mr. Anderson said that while the stope face position had shown progressive improvement resulting in a regular stepping up of tonnage milled, working results had been adversely affected by a number of factors. The chief of these were insufficient supply of labour, increases in the cost structure, continued need to carry out extensive cementation work to seal off water-bearing fissures, and a shortage of electric power. In the light of these difficulties, the gradual but steady improvement in the mine's position and in operating results was encouraging for the future.

The report and accounts were adopted and the retiring directors, Messrs. W. H. A. Lawrence, T. P. Stratten and J. S. Walker, were re-elected.

DIVIDENDS

Ampat Tin Dredging 15%
 Anglo Iranian Oil 30%
 Bank of British West Africa 7%
 Bulolo Gold Dredging 50 c. i
 Central Provinces Manganese Ore 47½% (June 8)
 Consolidated African Selection Trust 15% i
 Consolidated Zinc 10% (July 1)
 Dunlop Rubber 17½%
 Golden Horse Shoe (New) 8½%
 Head, Wrightson 12½% (July 22)
 Henderson's Transvaal Estates 15%
 H. I. Enthoven and Sons 30%
 Imperial Smelting 6%
 Killinghall Tin 10%
 Mason and Barry 20%
 New Broken Hill Consolidated 15% (July 1)
 Phelps Dodge 65 c.
 Placer Development \$1 i (June 18)
 Rio Tinto Co. 20%* (June 15)
 Selection Trust 30% (July 15)
 Seltrust Investments 132½% (July 10)
 South Crofty 3d. (June 17)
 Standard Bank of South Africa 7½%
 Stream-Line Filters 15% i
 Trinidad Leaseholds 5% i*
 Tweefontein Colliery 22½% (July 16)
 Waihi Investments and Exploration 7½%

i interim

*tax free

BRITISH INSULATED CALLENDER'S CABLES

TURNOVER OF £85,000,000

The eighth annual general meeting of British Insulated Callender's Cables Ltd., will be held on June 18 in London.

The following is an extract from the circulated statement of the chairman, **Sir Alexander Roger, K.C.I.E.:**

During 1952 the parent company enjoyed the benefits of a full order book, enabling us as materials became more freely available to plan production on the most efficient basis and to achieve record figures both in the volume and value of our turnover. Profit on trading increased by £1,435,183.

Of this improvement, after allowing for decrease in receipts from investments, 63 per cent is absorbed by taxation, the total requirements of which amount to the enormous figure of £3,368,492.

Out of the profit left available after taxation, we propose to transfer £500,000 to Contingencies Reserve and £1,000,000 to Reserve for Replacement of Fixed Assets; to bring the total distribution on the Ordinary capital for 1952 up to 10 per cent less income tax; and to add the £178,030 left unappropriated to the balance carried forward to 1953.

From an output point of view the experience of practically all members of the B.I.C.C. Group has been similar to that of the parent company and many substantial increases have been achieved.

Since the end of the war up to December 31, 1952, the B.I.C.C. Group have had to provide some £23,000,000 in their accounts for taxation. Favourable trading conditions, a conservative dividend policy, and, I think we can claim, good management and personnel, have enabled us, one might almost say in spite of taxation, to build up reserves. But think what could have been done in still further increasing our efficiency and strengthening our world-wide position had even one-third of our taxation requirements been left with us. Think, too, of the possibly delayed effect of those crippling taxation payments as we face the much more difficult trading conditions which now lie ahead.

In 1952 it may well be claimed that the B.I.C.C. Group have worked seven months for the Inland Revenue. Normally one would have been fully justified in passing harsh comment on these figures, but criticism must be tempered in the light of the recent Budget.

The world-wide turnover of the B.I.C.C. Group for 1952 (admittedly a period of high copper prices and great activity) was some £85,000,000.

It is impressive that this has been achieved notwithstanding the continuance of import and currency restrictions in many of our main markets and in face of growing international competition.

Easement in the raw materials supply position during the year has not diverted us from long-term plans to find and develop new and alternative uses of materials.

In the field of capacitors our Capacitor Group Research Company, British Dielectric Research Ltd., has made several successful developments.

THE OUTLOOK

Some months ago there was a noticeable change from a sellers' to a buyers' market and competition, especially in overseas markets, is now particularly keen. This, with the general shortage of finance, very marked in certain overseas countries, and almost everywhere a varying lack of confidence in the immediate future, has resulted in a substantial falling off in the rate of intake of new orders.

Probably the greatest single factor in our business contributing to this lack of confidence is the present uncertainty regarding the basic prices of raw materials (and copper particularly) with a natural and understandable tendency for customers to use up to a maximum their existing stocks. People cannot, however, continue to live indefinitely on stocks, but it is difficult to see any quick swing back to more normal purchasing until there is a greater stability than now in the basic prices of important raw materials.

The achievement of this stability and the general return of confidence may take time, and conditions during 1953 are not likely to be as good as in the record year of 1952, which, in retrospect, was undoubtedly a year of very favourable trading. But over any reasonable period the demand for our products must continue. We have a wide base both in the variety of our products and in the world-wide spread of our activities. We are constantly improving the efficiency of our plant and machinery. And, above all, we have in the B.I.C.C. Group an Organization and a body of loyal and competent men and women who will, I am confident, be equal to the problems which may confront us.

BRITISH ROPES LIMITED

RECORD TOTAL SALES

The thirty-first annual general meeting of British Ropes, Ltd., was held on May 27 in London.

Mr. Herbert Smith, the chairman, in the course of his speech, said: The trading profit of the group before taking into account exceptional items is approximately £500,000 less at £1,868,000 than the £2,365,000 recorded from the previous year, despite an increased turnover. After taking into account the exceptional items the group profit at £1,399,000 is down considerably when compared with the £2,592,000 recorded in the previous year.

The net dividends paid and proposed to be paid are at the same rates as for 1951, but following the bonus issue of Ordinary shares last year the amount required to meet the net dividend on the Ordinary stock is £206,000 compared with £149,000 in the previous year. The net distribution is £206,558, which is almost identical with last year.

During the year 1952 the value of our total sales reached a record figure, and we recovered in our Wire and Wire Rope Sections from the shortage of steel wire which curtailed our activities in 1951.

In the aggregate our export sales recovered to some extent from the low level of 1951, mainly on account of the improved supplies of steel during the latter part of the year. The aggregate value rose very considerably. Competition has now become very much more intense, and bearing in mind the number of markets which are partly or wholly restricted on account of import controls, it is clear that only the maximum effort and efficiency will enable us to maintain our position in the export field during this year.

The factories of our subsidiaries in Canada showed satisfactory results in 1952, and the new factory at Vancouver is nearing completion. I am pleased to say that the dividends received from the South African interests are also satisfactory, and appear likely to continue so. The amount of business we have done in the United States has declined during the year under review, but we are using every endeavour to increase this trade and feel confident that we shall be successful.

Wire, wire ropes and cordage are essential to the prosperity of this country either in peace or in war, and we can be quite certain that if trade generally is good then we shall be busy.

The report was adopted.

CONSOLIDATED MURCHISON (TRANSVAAL) GOLDFIELDS AND DEVELOPMENT COMPANY, LIMITED

(Incorporated in the Union of South Africa)

Directors' Report for the quarter ended March 31, 1953

The following is the report on the work done during the quarter ended March 31, 1953:—

Tons crushed	15,100
Estimated Profit from Antimony and Gold	£124,711
Estimated Taxation	£ 32,000

Revenue of £192 in addition to the above was received during the quarter from sales of gold for manufacturing purposes.

The capital expenditure during the period amounted to £31.

During the quarter the development footage accomplished amounted to 562 feet.

Of this, 36 feet were accomplished in the ore body, of which 30 feet were sampled and found to be unpayable on account of the combined gold and antimony content.

A further 426 feet were accomplished in lenses known to carry gold values only. 340 feet were sampled and proved to be unpayable giving an average value of 2.75 dwts. per ton over a width of 69 inches.

By Order of the Board,

ANGLO-TRANSVAAL TRUSTEES LIMITED,
LONDON SECRETARIES
I. C. H. GLASS,
Secretary.

ANGLO AMERICAN CORPORATION OF SOUTH AFRICA, LTD.

(Incorporated in the Union of South Africa)

ABRIDGED REPORT OF THE DIRECTORS FOR THE YEAR ENDED DECEMBER 31, 1952

The profit for the year was £3,015,426 as compared with £2,894,345 for 1951.

The companies in which the Corporation had a substantial direct interest at the 31st December, 1952, are set out below; the companies administered by the Corporation being shown in heavy type.

FINANCE AND INVESTMENT—African and European Investment Company Limited, Anglo-American Investment Trust Limited, Central Mining Free State Areas Limited, Epoch Investments Limited, The New Era Consolidated Limited, Orange Free State Investment Trust Limited, Rand Selection Corporation Limited, Rhodesian Anglo American Limited, South African Mines Selection Limited, West Rand Investment Trusts Limited.

GOLD (PRODUCING)—Brakpan Mines Limited, Daggafontein Mines Limited, East Daggafontein Mines Limited, Grootvlei Proprietary Mines Limited, Rand Leases (Vogelstruisfontein) Gold Mining Company Limited, The South African Land and Exploration Company Limited, Spring Mines Limited, Vlakfontein Gold Mining Company Limited, Welkom Gold Mining Company Limited.

GOLD (PROSPECTING AND DEVELOPING)—Ellaion Gold Mining Company Limited, Freddie's North Lease Area Limited, Freddie's South Lease Area Limited, Free State Geduld Mines Limited, General Exploration, Orange Free State, Limited, Hartbeestfontein Gold Mining Company Limited, Jeannette Gold Mines Limited, Loraine Gold Mines Limited, President Brand Gold Mining Company Limited, President Steyn Gold Mining Company Limited, Stilfontein Gold Mining Company Limited, Vaal Reefs Exploration and Mining Company Limited, Western Holdings Limited, Western Ultra Deep Levels Limited, Witkop Proprietary Company Limited, Witwatersrand Deep Limited.

BASE METALS—Munnik Myburgh Chrysotile Asbestos Limited.

COAL—Natal Coal Exploration Company Limited, The Vereeniging Estates Limited, (Also African and European Investment Company Limited, and South African Mines Selection Limited.)

INDUSTRIAL AND SUNDRY—African Cables Limited, American Anglo-Transvaal Investment Corporation Limited, Anglo American Prospecting Company Limited, *Anmercosa Land and Estates Limited, East Rand Engineering Company Limited, Eriksen Consolidated Holdings Limited, First Electric Corporation of South Africa Limited, Hard Metals Limited, Industex Limited, James Thompson Limited, Monazite and Mineral Ventures Limited, National Finance Corporation of South Africa, New Monteleo Limited, Orange Free State Land and Estate Company (Proprietary) Limited, Rhodesia Monteleo Asbestos Limited, Zinc Products Limited.

* Subsidiary Company.

Finance and Investment Companies

AFRICAN AND EUROPEAN INVESTMENT COMPANY LIMITED—The profit of African and European Investment Company Limited for 1952 was £929,344, as compared with £856,531 for the previous year. Preference and Ordinary Dividends paid amounted to £430,000.

THE NEW ERA CONSOLIDATED LIMITED—This Company's principal interests are represented by its shareholdings in the gold and diamond mining concerns of the Anglo American Group.

The gross revenue for the year was £614,979, which was an increase of £417,403 compared with last year's figure. The net profit rose by £425,454 to £598,739.

RAND SELECTION CORPORATION LIMITED—The net profit for the year ended September 30, 1952, amounted to £780,406, compared with £829,916 for the previous year.

THE VEREENIGING ESTATES LIMITED (Year ended December 31, 1952)—The profit of The Vereeniging Estates Limited for 1952 was £951,173 as compared with £762,736 for the previous year. Dividends paid amounted to £756,250.

Producing Gold Mines in the Transvaal

During 1952 the tonnage milled decreased by 11,000 to 9,963,500. The revenue per ton was 1s. 11d. less and the cost per ton was 1s. 11d. more. The decrease of 3s. 10d. per ton in the working profit resulted in a reduction of £1,942,187 in the total profit.

All producing mines encountered two major difficulties during the year, namely shortage of native labour and a restricted supply of electric power. The shortage of native labour was more serious in 1952 than in 1951.

West Rand Interests—The Corporation has a very substantial interest in West Rand Investment Trust Limited, through which Company the Corporation's interests in the Far West Rand and in the Klerksdorp area are held.

The profit for the year before taxation amounted to £629,595, compared with £645,276 for the previous year.

Orange Free State Interests—Further considerable progress was made in the opening up and development of the Orange Free State goldfields during the year 1952, and in the first few months of 1953. For the majority of the thirteen mines which are being established in the area, this period marked the transition from shaft sinking to the underground development stage. The major portion of the original shaft sinking programme has now been completed, and of the 27 shafts scheduled to be sunk in the area 21 had either been completed or had intersected the Basal Reef by March 31, 1953.

ORANGE FREE STATE INVESTMENT TRUST LIMITED—The Company played an important part during 1952 in providing the capital required by a number of the mining companies at present operating in the Orange Free State.

FREE STATE GEDULD MINES LIMITED—Operations on this Company's mine during the past year were adversely affected by the two heavy inrushes of water which occurred in the No. 2 Shaft in September, 1952, and in January, 1953. The technical advisers to the Company are confident that the water in the fissures can be effectively sealed, and that future development operations will not be unduly affected.

LORAIN GOLD MINES LIMITED—Preliminary development operations in the No. 1 Shaft area were started during March, 1953, following upon the completion of sinking of the shaft to a final depth of 5,475 feet in February. It is expected that a small development footage will be accomplished on reef during the second quarter of this year.

PRESIDENT BRAND GOLD MINING COMPANY LIMITED—Development operations were started from the No. 1 Shaft area towards the end of the year following the completion of sinking the shaft to a final depth of 4,879 feet below the collar in December, 1952. A development footage of 1,998 feet was accomplished during the quarter ended March 31, 1953.

PRESIDENT STEYN GOLD MINING COMPANY LIMITED (Year ended December 31, 1952)—Since end of last year small tonnages of development rock have been milled for plant and metallurgical test purposes. It is hoped that the mine will start production in the last quarter of 1953, and that a milling rate of 50,000 tons per month will be achieved by the end of the year.

ST. HELENA GOLD MINES LIMITED (Year ended December, 1952)—The Company achieved a steady increase in the milling rate during the first full year of operations. The total tonnage milled during the year was 598,000 tons, yielding 118,492 ounces of gold equal to 3.96 dwt. per ton milled.

The ore reserve at December 31, 1952, was calculated at 1,250,000 tons having an average assay value of 5.3 dwt. over an estimated stoping width of 50 inches, equal to 265 in. dwt.

WELKOM GOLD MINING COMPANY LIMITED—During 1952, the first full year of mining operations, 668,000 tons were milled for an average yield of 3.48 dwt. The monthly milling rate increased from 36,000 tons in January to 56,000 tons in December, 1952, the highest monthly rate of 57,500 tons being achieved in June and September. The progressive improvement in the milling rate during the early part of the year received a severe setback in July as a result of a serious inrush of water in the No. 1 Shaft mining area at the end of June. The Company made a working profit on mining of £15,139 for the year.

The ore reserve at December 31, 1952, was estimated at 974,200 tons with an average assay value of 5.00 dwt. over a stoping width of 50.00 inches, equivalent to 250 in. dwt.

WESTERN HOLDINGS LIMITED—The Company's mine is scheduled to start production on a substantial scale towards the middle of 1953.

The development footage achieved has been satisfactory, and 49,746 feet had been driven by the end of March, 1953.

Diamond Interests—The Corporation maintains its interest in the diamond business through a large shareholding in ANGLO AMERICAN INVESTMENT TRUST LIMITED. The Company made a profit for the year 1952 of approximately £3,669,000 after providing for taxation.

Northern Rhodesian Interests—The Corporation's interests in Northern Rhodesia are retained through its investments directly and through Rhodesian Anglo American Limited, in Rhokana Corporation Limited, Nchanga Consolidated Copper Mines Limited, The Rhodesian Broken Hill Development Company Limited, and Mufulira Copper Mines Limited.

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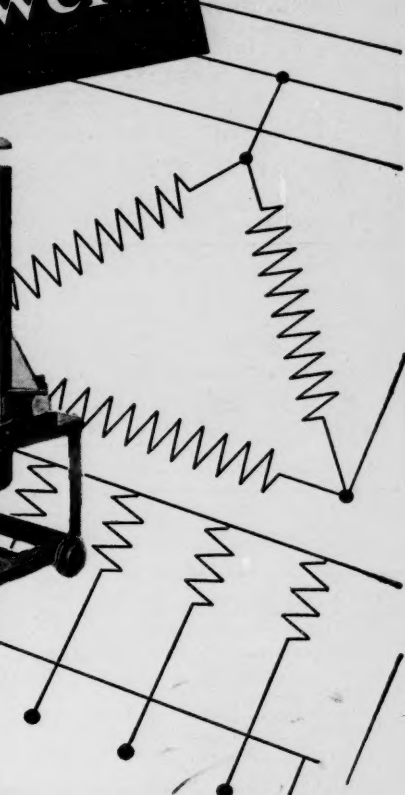
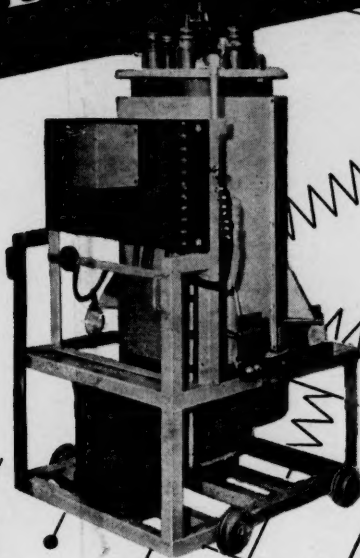
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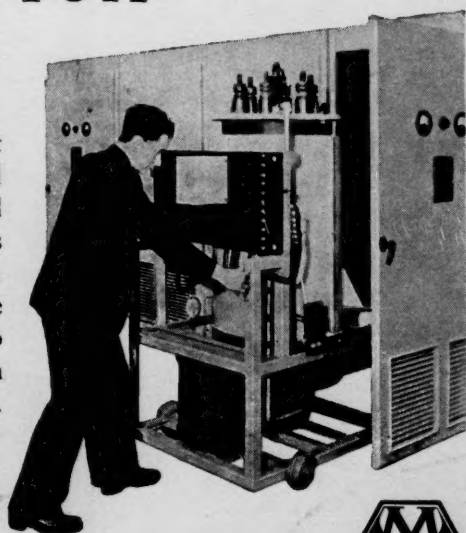
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